A window open on the world

The UNESCO Courier

October 1967
(20th year)
U.K. : 1/6-stg.
Canada : 30 cents
France : 1 F

UNESCO
ARCHIVES

MARIE CURIE

TREASURES OF WORLD ART

20

Korean altar boy

This unique figure of a Buddhist altar attendant was carved in Korea during the late Yi Dynasty (18th-19th) century. Thirty inches high and made of polychrome wood, it is now in the Honolulu Academy of Arts, Hawaii. No other similar figure, either in Korea or elsewhere, exists today comparable with it either in size or quality. Such statues were placed in pairs on either side and in front of the Buddha in provincial temples of Korea. This one originally held a bird in its hands.

Photo © Honolulu Academy of Arts, Hawaii.

2 OCT01967

The UNESCO Courier

OCTOBER 1967
20TH YEAR

NOW PUBLISHED IN ELEVEN EDITIONS

English
French
Spanish
Russian
German
Arabic
U.S.A.
Japanese
Italian
Hindi
Tamil

Published monthly by UNESCO

The United Nations Educational, Scientific and Cultural Organization

Sales and Distribution Offices
Unesco, Place de Fontenoy, Paris-7e.

Annual subscription rates: 15/-stg.; $3.00 (Canada); 10 French francs or equivalent; 2 years: 27/-stg.; 18 F. Single copies 1/6-stg.; 30 cents; 1 F.

★

The UNESCO COURIER is published monthly, except in August and September when it is bi-monthly (11 issues a year) in English, French, Spanish, Russian, German, Arabic, Japanese, Italian, Hindi and Tamil. In the United Kingdom it is distributed by H.M. Stationery Office, P.O. Box 569, London, S.E.I.

Individual articles and photographs not copyrighted may be reprinted providing the credit line reads "Reprinted from the UNESCO COURIER", plus date of issue, and three voucher copies are sent to the editor. Signed articles reprinted must bear author's name. Non-copyright photos will be supplied on request. Unsolicited manuscripts cannot be returned unless accompanied by an international reply coupon covering postage. Signed articles express the opinions of the authors and do not necessarily represent the opinions of UNESCO or those of the editors of the UNESCO COURIER.

The Unesco Courier is indexed monthly in The Readers' Guide to Periodical Literature, published by H. W. Wilson Co., New York.

★

Editorial Offices
Unesco, Place de Fontenoy, Paris-7e, France

Editor-in-Chief
Sandy Koffler

Assistant Editor-in-Chief
René Caloz

Assistant to the Editor-in-Chief
Lucio Attinelli

Managing Editors
English Edition: Ronald Fenton (Paris)
French Edition: Jane Albert Hesse (Paris)
Spanish Edition: Arturo Despouey (Paris)
Russian Edition: Victor Goliachkov (Paris)
German Edition: Hans Rieben (Berne)
Arabic Edition: Abdel Moneim El Sawi (Cairo)
Japanese Edition: Shin-Ichi Hasegawa (Tokyo)
Italian Edition: Maria Remiddi (Rome)
Hindi Edition: Annapuzha Chandrahasan (Delhi)
Tamil Edition: Sri S. Govindarajulu (Madras)

Research: Olga Rödel

Layout & Design: Robert Jacquemin

All correspondence should be addressed to the Editor-in-Chief

Page

4 THE MENACE OF 'EXTINCT' VOLCANOES
By Haroun Tazieff

14 MARIE CURIE
The life of a woman dedicated to science

16 THE RAREST, MOST PRECIOUS VITAL FORCE
By Marie Curie

18 YEARS OF HAPPINESS, WORK AND TRIUMPH

20 MARIA SKLODOWSKA
THE DREAMER IN WARSAW
By Leopold Infeld

23 THE WOMAN WE CALLED 'LA PATRONNE'
By Marguerite Perey

24 RUBEN DARIO
The resurrection of Hispano-American poetry
By Emir Rodriguez Monegal

27 GREAT MEN, GREAT EVENTS

30 THE WORLD FOOD PROGRAMME
A new form of aid for development
By Colin Mackenzie

33 FROM THE UNESCO NEWSROOM

34 LETTERS TO THE EDITOR

2 TREASURES OF WORLD ART
Korean altar boy

Cover photo

Photo Archives Pierre et Marie Curie.

One hundred years ago a woman who was to become one of the most illustrious scientists of our century was born in Warsaw. Maria Sklodowska, or Marie Curie as the world was to know her, dedicated her entire life passionately and unselfishly to science and above all to the completely new science of radioactivity, of which she was one of the pioneers (see page 14). The "Unesco Courier" has asked a distinguished Polish physicist, Leopold Infeld, and a French woman scientist, Marguerite Perey, who worked for several years with Marie Curie, to recount the early life of this woman of genius (page 20) and the closing years of her work for science (page 23).

N° 10 - 1967 MC 67-1-228 A

UNESCO ARCHIVES

Photo © APN G.S.Gorshkov

Mount Bezimianyi "explodes". This "extinct" volcano (its name signifies "unnamed") on the Kamchatka Peninsula, to the east of Siberia, was considered unimportant by volcanologists who focused their attention on strongly active volcanoes in the region. Suddenly, on March 30, 1956, a tremendous explosion blew the top off Bezimianyi, hurtling debris 40 kilometres (25 miles) into the air at a speed of over 1,000 km/h (700 mph) and devastating 1,000 sq.km. (400 sq. miles) of forest. This photo was taken from 45 km. away.

THE MENACE OF 'EXTINCT' VOLCANOES

by Haroun Tazieff

In the almost twenty years I have been travelling around the world trying to get to know something about the most splendid and violent spectacle that nature has to offer, I have gradually become convinced of something that laymen and even professional geologists and volcanologists usually ignore, and it fills me with dread—the prospect, some day soon, of unheard-of volcanic catastrophes.

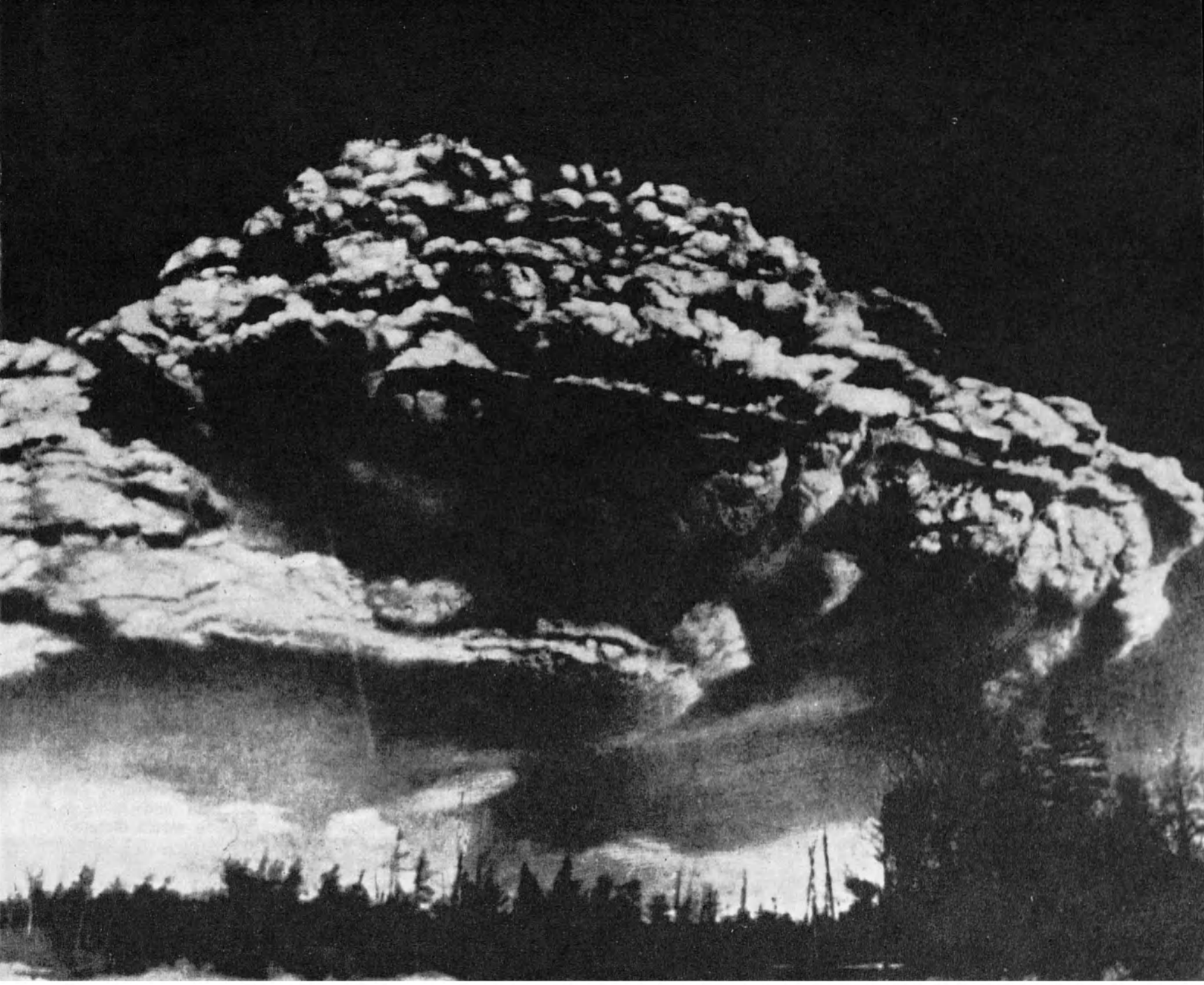
HAROUN TAZIEFF, *Belgian geologist and volcanologist, is well known to our readers (see the "Unesco Courier", October 1963; November 1965). He is the author of many scientific publications and several popular science books and has produced a number of prize-winning scientific and documentary films on volcanic eruptions. This text is taken from a study published in Unesco's quarterly, "Impact of Science on Society", No 2, 1967 (annual subscription $2,50; 13/-).*

You may perhaps imagine that only the stupid outbreak of nuclear war could cause the deaths of a hundred thousand, five hundred thousand, or a million people within a few minutes, but you would be wrong; wrong, because, as geological evidence has finally convinced me, humanity has so far been fantastically lucky and the catastrophes of Pompeii and St. Pierre de la Martinique are nothing to what awaits it.

A loss of thirty thousand, forty thousand people killed by the blast of a volcano—these were already bad enough; but these were small towns compared with the enormous modern cities threatened at closer or longer range by a volcanic outburst— Naples and Rome, Portland and Seattle, Mexico City, Bandung, Sapporo, Oakland, Catania, Clermont-Ferrand. . .

Yes indeed! Rome, Portland, Clermont-Ferrand: volcanoes regarded as well and truly extinct near these cities are dead only to eyes that cannot or will not see. Men, as we all know, have short memories. Political or natural, catastrophes cease to worry them almost as soon as over, and teach them little. A volcano may be less than a century dormant and people almost cease altogether to think of it as such; all the more so if a thousand years or more has passed.

But volcanoes are geologically live: time, for them, is counted not in years or even in centuries, but in millenia and tens of millenia. The thousand-year sleep that is nothing to them is an eternity to men living under their shadow—the volcanoes of the Massif



Central in France, those of Latium, of the Cascade Range in Oregon, and of California (although the latter had numerous, if not major, eruptions throughout the last century, and even as recently as 1916 in the case of Lassen Peak).

But Clermont-Ferrand, Rome? Completely forgotten by the inhabitants, the fact remains that only a few millenia separate us from the last eruptions. In the course of their lifetimes, millions of years long, there must have been many lulls, for dozens or even hundreds of centuries, and there are really no grounds for supposing that the present calm signifies the end of the volcano's activity rather than a period of repose. Obviously the very length of these quiet periods is hopeful; centuries, hundreds of centuries might pass and Clermont-Ferrand, Rome or Seattle not be wiped out. But the interval might be much less.

The two most violent eruptions of the twentieth century occurred at apparently extinct volcanoes; the first at the Katmai volcano in Alaska from June 6 to 8, 1912, the second at the Bezimianyi Sopka in the Kamchatka peninsula on March 30, 1956. Relatively little was known about Katmai and its neighbouring volcanoes, but ten years ago it was thought that there remained little to learn about the volcanic chain around the Bezimianyi volcano—indeed, Klyuchi, hardly 50 kilometres away, is one of the best-known volcanological observatories. Nevertheless, and despite intensive study of the strongly active volcanoes in the area, no importance was attached to this insignificant "extinct" cone, its very name, "Unnamed" emphasizing its insignificance.

The explosion of March 30, 1956 blew the top off the mountain, hurtling debris 40,000 metres into the air, blasting down the forests at its base, and snapping tree trunks like matchwood up to 20 kilometres away. As in Alaska forty-four years earlier, no-one was killed, but only because these regions are practically uninhabited. What would happen in six months, six years or sixty times six years if a cataclysm on this scale were to strike Java or Japan?

In fact such a cataclysm did occur, although fortunately on a smaller scale, about fifteen years ago in New Guinea. In this case it was not even known that the mountain was a volcano; Mount Lamington, near the eastern end of New Guinea, had been regarded as just an ordinary mountain until the day when, on January 16, 1951, a thin column of vapour was seen rising from its summit. The next day slight earth tremors were noticed around the foot of the mountain. The escapes of gas and the tremors increased during the next two days, and a small amount of ash was ejected.

On January 20, the eruption had become spectacular; the wreath of ashes reached up over 10,000 metres into the sky and rumblings were heard, sometimes dozens of kilometres away

On Sunday January 21, the volcano was roaring continuously and at 10.40 a.m. it exploded: a fearsome wreath of convoluting clouds of gas, spilling ash, lapilli and blocks, shot up to a height of 15,000 metres in a matter of seconds and formed a huge mushroom cloud, while a glowing avalanche spread over the ground with the same terrifying speed. Two hundred and fifty square kilometres of

Rome, Mexico City, Oakland, Seattle, Bandung, Catania, Sapporo, Clermont-Ferrand... on the waiting list

countryside were laid waste, and 3,000 people killed.

I have tried to intimate to readers my anxiety about supposedly extinct volcanoes; but there is another, yet more terrifying menace: the menace of ignimbrite flows.

There has only been one ignimbrite eruption in historic times. It was relatively moderate. I say relatively because it nevertheless covered a surface some 30 kilometres long by 5 kilometres wide with a layer on average 100 metres deep, which, if spread over the whole of Paris would bury it nearly 10 metres deep. This was the eruption which created the Valley of Ten Thousand Smokes in Alaska in 1912 to which I alluded earlier.

The geological history of the earth is, however, full of really colossal ignimbrite escapes in which thousands and tens of thousands of square kilometres have been suddenly engulfed beneath suffocating clouds of gas and avalanches of incandescent sand.

THERE are a great many sheets of ignimbrites in New Zealand, where they were described for the first time some thirty years ago, and there are also many in the United States and Italy, Japan and the Soviet Union, Kenya, Chad, Sumatra and Central America, Latin America, Iran and Turkey.

All these were the result of sudden, almost lightning-fast escapes of magma, supersaturated with gas, which, after forcing open a long fissure, spurted up and spread out, allowing for differences of scale, somewhat like milk boiling over from a saucepan. It is almost certain that speeds of over 100, perhaps even 300, kilometres an hour were reached, and the very nature of the material spewed out in this way—with droplets of lava, vitreous fragments of exploded bubbles and incandescent fragments of pumice suspended in the released gas—made it so fluid that it was able to spread over immense areas, immediately wiping out all life.

As already indicated, the only ignimbrite eruption known to have occurred in the world in historic times is that of the Valley of Ten Thousand Smokes. This name was given to the valley by Robert Griggs when, after great effort, he and his team arrived in 1917, five years after the eruption, at the head of the Katmai Pass and discovered the extraordinary expanse of salmon-pink and golden sand from which innumerable jets of high-pressure steam were rising, thousands of fumaroles caused partly by the rivers and streams trapped under the thick sheet of burning ignimbrite sands, and partly by the magma gases still imprisoned in the sands.

Fifty years to the day after the eruption, on June 6, 1962, it was the turn of my friends the geologists Marinelli, Bordet and Mittempergher and myself to arrive in this fabulous valley: only three or four columns of steam still rose lazily at the top end of the valley, towards Novarupta, the small volcano whose detonations marked the end of the cataclysm.

We gazed for a long while at this tawny wilderness, stretching away astonishingly flat within its ring of mountains. But behind the wonder aroused by this austere beauty, behind the geological interest, behind our discussions of how the ignimbrites came to be there, there lay the inescapable thought that an eruption of this type might very well occur in the near future, not this time in a desert as in the Alaskan peninsula or the Tibesti Massif of the Sahara, but in some overpopulated part of the globe—for there are recent ignimbrites throughout Latium and California, throughout Japan and Indonesia.

This is what I have in mind when I speak of the possibility, or rather the probability, of volcanic catastrophes involving a million or even several million deaths. Like a giant land-mine under our feet, this danger threatens vast areas of the globe, including a number of countries which believe themselves safe from volcanic perils.

Governments, whether "advanced" or "developing", are obviously not worried, primarily because of ignorance, but also through lack of foresight. Thus, as soon as we arrived in a country on a volcanological investigation mission, the local authorities have sometimes submitted the most preposterous projects to us, not merely revealing a complete misunderstanding of what an eruption is but even proposing methods for slowing or stopping it or for harnessing its energy for industrial use; we have really had the greatest trouble in convincing them that their beautiful plans were scatter-brained.

During a recent mission to a country where an eruption had gone on continuously for a year, we could see as soon as we visited the volcano an unmistakable threat to the inhabited areas around its base; as soon as the rainy season started, the valleys would be swept by torrents of volcanic mud, the terrible lahars which year in and year out claim thousands of victims throughout the world.

Civil engineers should have set to work months beforehand to protect the population, building embankments to divert the thrust of the liquid mud pouring down at 50 or 60 kilometres an hour.

As nothing of the sort had been done, all that remained was to keep a watch on the upper slopes of the mountain where the lahars would start, and get the people ready to evacuate the threatened regions calmly and in good order at any moment of the day or night. I accordingly put a plan to the authorities but could see straight away that it evoked no enthusiasm whatsoever.

After a fortnight, my friend Ivan Elskens, the expedition's chemist, finally came up with a psychological explanation. Whatever a government may do to avoid a catastrophe, natural or otherwise, it will still be criticized by the opposition. Why lay oneself open —particularly since, whatever efforts are made, it is almost certain that they will not be totally successful, volcanological forecasting being at present no more foolproof than weather forecasting (although it seems as absurd not to attempt it as not to attempt to forecast the weather)? Natural catastrophes being, by the nature of things, beyond the power of governments, governments are unwilling to chance their funds on undertakings which simple prudence would dictate.

This is, I think, the reason why official contributions to volcanological research have been, except in the case of Japan, so insignificant. Earthquake forecasting, which is much more difficult than the forecasting of eruptions, receives equally little encouragement. The authorities try to forget disasters as quickly as possible: despite the destruction of San Francisco in 1906, the richest and most powerful country in the world had to wait sixty years, until the Anchorage disaster of 1964, before it was decided to invest in the necessary seismological equipment and try to forecast future cataclysms.

A FEW more examples like Krakatoa, St. Pierre de la Martinique, or Pompeii will probably be necessary before the decision is made to set up observatories which would make it possible to forecast the awakening of "extinct" volcanoes and the opening of fissures from which ignimbrite flows escape.

Providing the indispensable minimum of funds are allocated, it should be easier today to forecast the awakening of a volcano than to forecast the weather. This is, alas, still far from being the case. Forecasting depends on detecting significant fluctuations in a series of physical and chemical parameters. The difficulty lies in interpreting the changes observed; some of the parameters at times speak a rela-

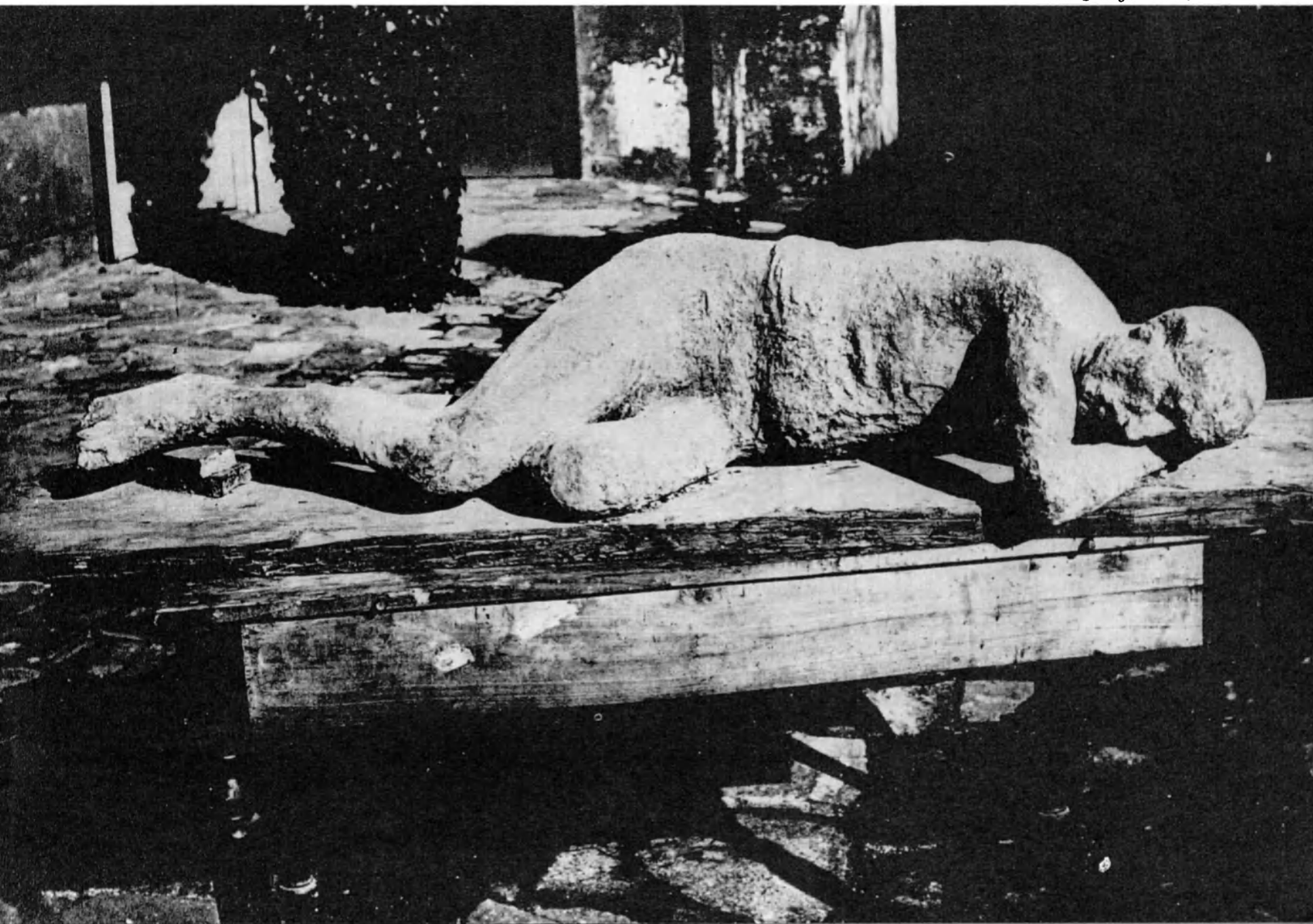
CONTINUED ON PAGE 8

Photo © Tony Saulnier

The 30,000 inhabitants of Pompeii and the 6,000 of neighbouring Herculanum were taken completely unawares when Mount Vesuvius began to erupt in earnest on an August morning in the year 79 A.D. Pompeii had just finished reconstructing most of its buildings, devastated in the earthquake which ravaged the city 17 years earlier. When the hail of volcanic ash and pumice descended on the city, some people sought refuge in their homes while most fled across the countryside. Thousands succumbed. The city remained buried for 18 centuries until it was gradually dug out. Today, Pompeii, like Herculanum, presents the dramatic spectacle of a powerful Roman city in the grip of fear and death. Plaster moulds of the cavities left in the ashes after bodies had mouldered into dust show the postures of people at the moment they were killed by fumes, ashes and debris. Below, the outline of the body of a man who died in the last moments of Pompeii. Left, close to the Forum in Pompeii, a statue of Apollo stands out today against the backdrop of Vesuvius.

THE LAST MOMENTS OF POMPEII

Photo © Roger Viollet



Eruption forecasting could be easier than predicting the weather

tively comprehensible language while others remain, for the present at least, indecipherable.

Since we are still at the stage of conjecture regarding the causes and consequently the mechanism of eruptions, these variation which modern techniques make it possible to measure cannot really be understood nor, therefore, can their meaning be interpreted with certainty.

But there is a gradual improvement, and successful forecasts of impending activity have several times been made, the best example being the eruption of Kilauea in December 1959-January 1960: seismographs had given notice of the awakening of the volcano nearly six months before it erupted.

Thanks to their excellent observation network on Hawaii and on Kilauea itself, scientists of the volcanological observatory were able to determine the focal depth of the tremors: about 50 kilometres, which is suprising enough for volcanic seismic effects, the hypocentre of which is usually localized less than 5 kilometres below the surface, and still more surprising in Hawaii where the lower limit of the earth's crust itself is only 15 kilometres below sea level.

In the following weeks, the volcanologists noted that the focal depth was getting less and less and by measuring the speed of the rise they produced an estimate of the time it would take for this depth to be reduced to zero, i.e., when the magma would erupt at the surface.

As the measurements continued the coefficient of error due to extrapolation was reduced. A network of field seismographs was brought into service in addition to the fixed network, allowing high-precision determination of the

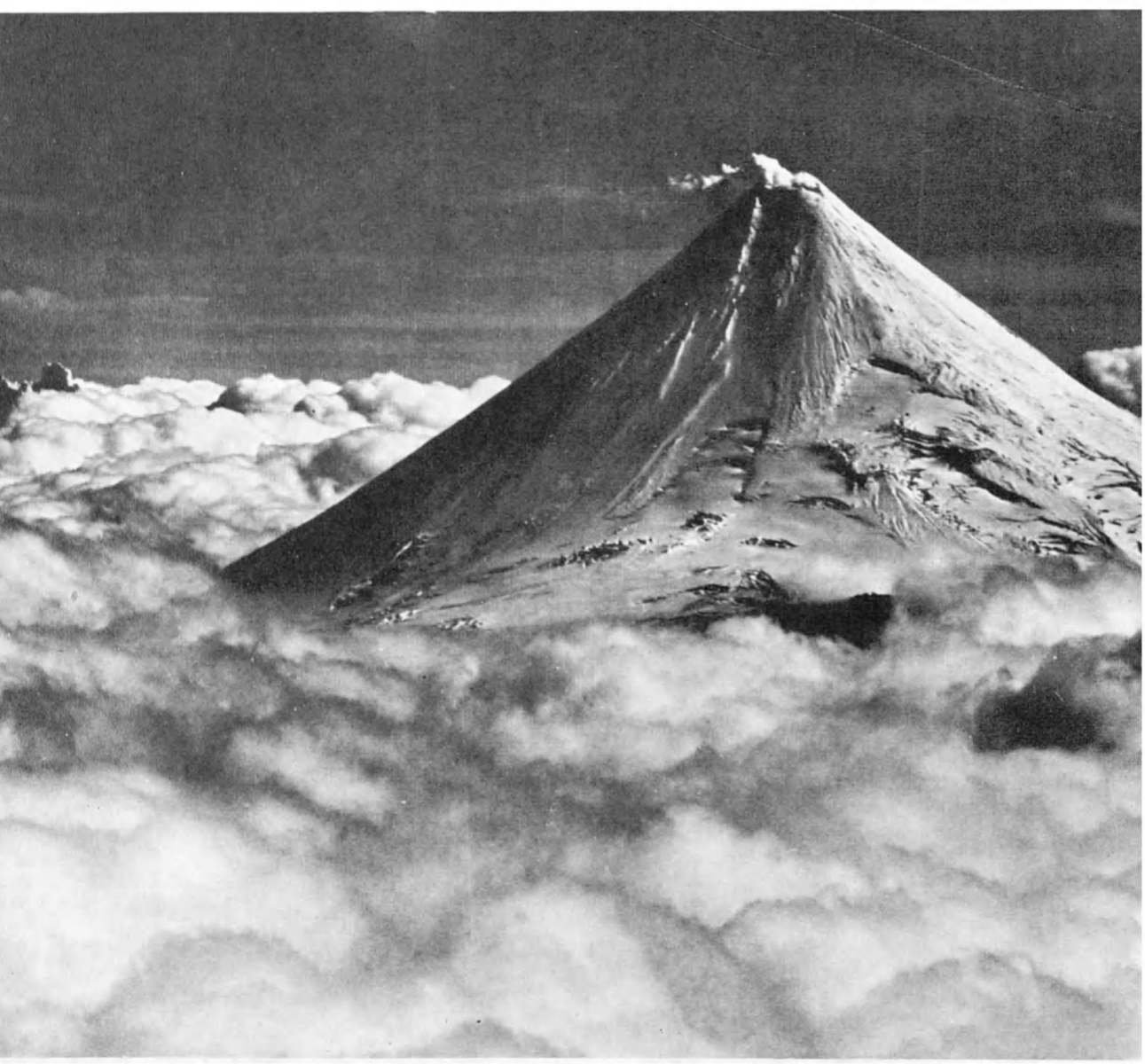
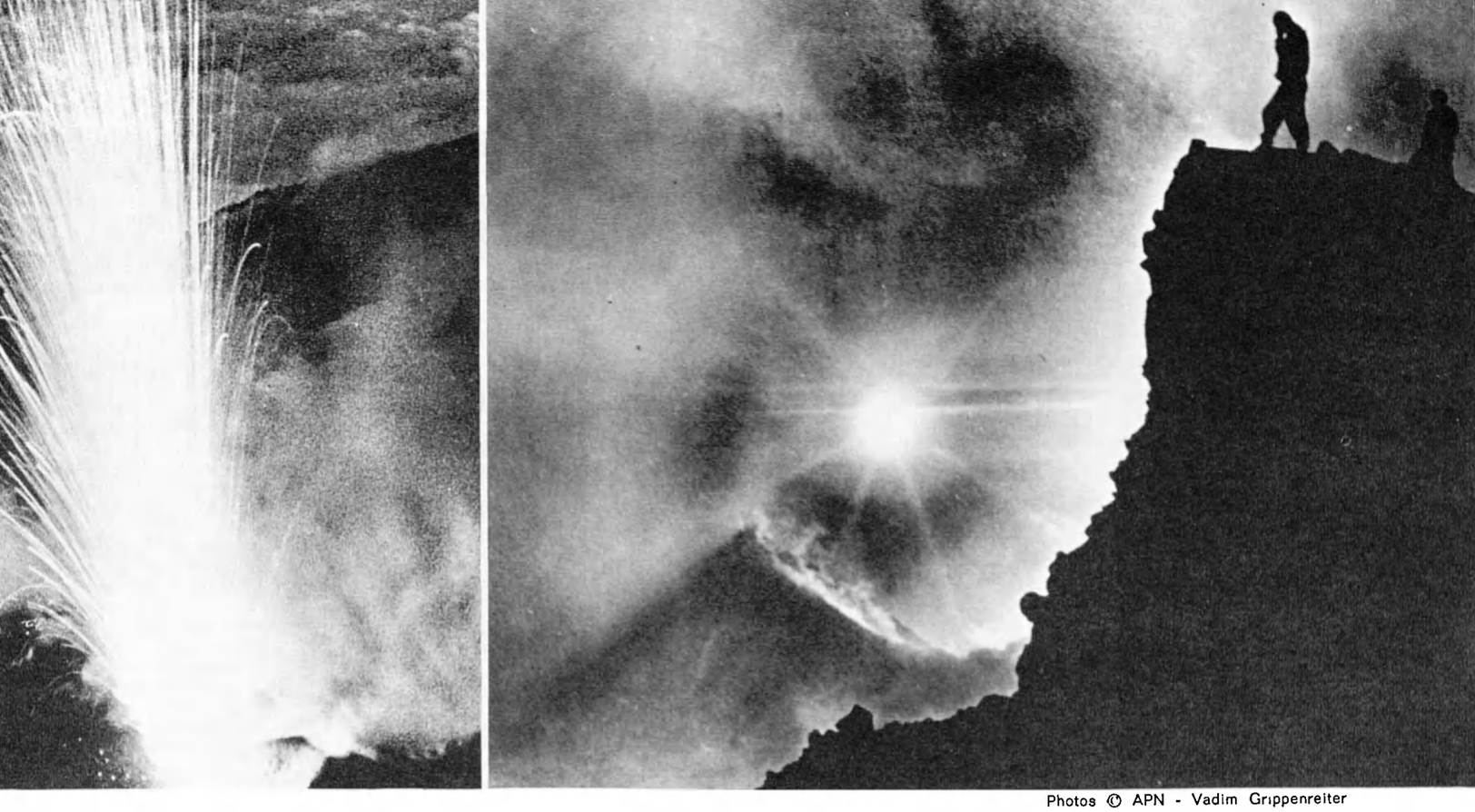


Photo USIS

THE CIRCLE OF FIRE AROUND THE NOT SO PACIFIC OCEAN

No less than 62 per cent of the world's active volcanoes are located in what is often called "the circle of fire" in the Pacific. Left, the majestic cone of Mt. Shishaldin in Alaska, one of the 79 volcanoes in a chain running through the Aleutian Islands into the Alaskan peninsular. Above, grandiose firework displays from active craters in the Kamchatka chain (28 volcanoes).



Photos © APN - Vadim Grippenreiter

epicentres, i.e., the zones where the eruption was likely to take place (with this vast shield volcano, eruptions can occur equally well in the area of the central crater or up to 10 or 20 kilometres away on the slopes of the mountain).

As the tremors increased in number and intensity, the whole volcano swelled, probably under the pressure of the rising magma—the angles and directions of this tumescence, which is otherwise quite imperceptible, can be accurately measured with the aid of instruments know as tiltmeters or clinometers.

Thus, by carefully following the evolution of phenomena which had long been known to be closely connected with the rise of the magma, the scientists at Hawaii Observatory were able to predict with unprecedented accuracy the exact point—the Kilauea Iki crater—and moment where the eruption would take place.

They went even better: when the eruption stopped after three weeks of violent and spectacular activity, not only were they able to state that it had not finished and would start again, but were even able to say that this would happen 15 kilometres away near the small village of Kapoho. As a result, it was possible to evacuate the population and even all their movable belongings before the earth gaped open to release the gas and incandescent lava which was to destroy the houses and fields.

Unfortunately, it is not always so easy to interpret seismograph and clinometer data. The behaviour of volcanoes of the Hawaian type is relatively straightforward, but that of most of the others is not—particularly the dangerously explosive stratified cones which abound in the circum-Pacific "ring of fire". These latter are, however, up to now at least, the subject of the most wary observation, since more than half of the paltry dozen volcanological observatories which exist are concentrated here, most of them in Japan, one in Kamchatka and another in New Britain (largest island of the Bismarck Archipelago to the east of New Guinea).

There is as yet no means of knowing exactly why eruptions of one type are fairly predictable and why others defy forecasting. The difference appears to depend on the nature of the magma, on its chemical composition, its viscosity, its content in dissolved gases, and perhaps even its origins.

Let us accept for the moment the theory that the substance emitted by basaltic volcanoes comes from a deep magma, highly fluid and relatively poor in gases and everywhere present beneath the earth's crust, whilst the circum-Pacific volcanoes are fed by limited magma chambers, strung out along narrow zones and consisting of pockets, within the crust itself, of molten rocks whose composition gives the substance a high viscosity and a high gas content. It is then easy to see that the eruptive processes of these different types of magma will be different and so, therefore, will be the premonitory signs which make it possible to predict them.

To reach the surface and erupt, a fluid magma coming up from the depths of the earth has to force its way through kilometres of rock, thus opening fissures first in the depths of the earth and then higher and higher as it rises, or widening existing conduits. When it finally reaches the last few kilometres, this new intruded material produces a swelling in the configuration of the volcano itself and it is this which the seismographs and tiltmeters register: the tremors accompanying the opening of the fractures, and the tumescence of the mountain itself.

The magmas of the circum-Pacific chain are a different matter. Probably starting life at lesser depths with the melting of sediments within the earth's crust itself, rich in silica and water, they are both viscous and gas-supersatured.

Before going any further, I would like to point out that although these ideas are based on geological evidence, they are nevertheless only a hypothesis, and the evidence could be interpreted in different ways. We know a lot less about the inside of our own planet than about outer space—a paradox that has various explanations; partly the nature of cosmic and terrestrial matter, but also the incredible disproportion in the sums allocated for these two different kinds of research.

The inadequacy of the funds allocated for the study of the interior of the earth shows once again how underestimated is the importance of such research.

Even from the utilitarian point of view, the future of mankind lies here on earth. Mankind will have to dig deeper and deeper into the earth to find mineral deposits when those at the surface have been exhausted, but the old empirical methods of finding them will no longer do, and they will have to be located before drilling even starts; for this we shall need more positive theories concerning the origin of these deposits than those we make do with at present, and we shall find them only if we go and look for fresh data in the depths of the earth itself.

Accepting the hypothesis that the

CONTINUED ON NEXT PAGE

Rip-Van-Winkles and legends of Sleepy Hollows

circum-Pacific magmas do not stretch round the whole globe in a continuous layer beneath the earth's crust but form pockets within the crust, that because of their viscosity, their mobility is extremely low, and that they contain a high quantity of dissolved gases, we can understand why seismographs and tiltmeters cannot, as in the case of basaltic volcanoes, clearly warn of the approach of an eruption.

If such be indeed the case, the magma would normally be quite near to the surface and the seismic effects accompanying any possible rise of the magma would not be distinguishable, as in the case of Hawaii, by their focal depth from the tremors due to various causes which are constantly occurring in the upper kilometres of any active volcano.

Moreover, this magma is often so viscous that the speed of its rise is greatly reduced, if not nil. The seismic effects connected with the rise of the magma may thus be lost among ordinary earth tremors, making it very difficult if not impossible for the seismologist to distinguish genuine foreshocks. Tiltmeter readings would be equally useless: the volcano will obviously not swell unless matter is rising up inside it.

How do these volcanoes erupt at all if there is little or no rise of the lava from the magma chamber towards the surface? It may be that the action of the gases alone is responsible.

Years or centuries may pass and as yet we have no means of telling from the surface of the earth that this slow concentration of endogenic energy is going on. As a result, such a crater will soon come to be classified as belonging to an extinct volcano—and we know the terrifying consequences which this may have.

In these circumstances, how can we forecast a renewal of activity? In the first place, at the risk of repeating myself, I would say that we must get it into our heads that whatever the type of volcano, magma or activity concerned, we shall never be able to predict anything with any accuracy unless a constant watch is kept by a specialized team.

Once this has been established, and accepting the theory that the violent explosions of volcanoes of the circum-Pacific type are in fact the result of the accumulation of gases under the roof of the chamber, it would seem logical to look for significant signs in possible changes in the fumaroles which the crater exhales to a greater or less extent and which have their origins inside the pocket of incubating lava. Changes discovered in this way may not always be easy to interpret —in so far as they can be interpreted at all—but logically they must hold a clue to what is going on down below.

THE temperature of some fumaroles has been recorded for a long time back, on the logical assumption that the temperature will rise as an eruption approaches. However, with acid volcanoes at least, this method of detecting an eruption has had practically no success. This is not surprising if we accept the theory that explosive eruptions are the result of the building up of gas pressure and not of the rise of magma, since it is essentially the latter which determines the rise in temperature.

We are thus left with the chemical composition of fumaroles, which ought to depend on the deep-lying processes mentioned above. The reflection of these processes in the chemistry of the fumarole gases should provide valuable information.

Observation of a dormant volcano may not require analyses at very close intervals, but the development of the chemical composition and pressure of the fumaroles should at least be followed step by step. Since only gases are involved, this alone might yield warning signs, however slight, by which to detect renewed volcanic activity. But the best hope for a better understanding of volcanic activity, and, hence, of developing volcanological forecasting is to make a close study of the variations, both sudden and gradual, in the gases given off from the mouth of an active volcano sampled at a fixed point.

This is the job with which we have been particularly concerned; to try and analyse the volcanic gases as nearly continuously as possible, and to look for warning signs in the variation in their composition and in the comparison between this variation and variations detected by other means such as the seismograph and the clinometer.

The first samples of gas taken by our group were analysed in a laboratory by Dr. Marcel Chaigneau, director of the Gas Laboratory at the Centre National de la Recherche Scientifique in Paris, using the Lebeau and Damiens method over a mercury trough. The results were extremely accurate but the operations took so long that, with the resources at our disposal (i.e., without special volcanological staff or

MOST TERRIFYING ERUPTION OF ALL

The most formidable form of volcanic activity is an ignimbrite eruption. It results from the sudden, almost lightning-fast escape of magma which, after opening up a long fissure in the ground, bursts forth and spreads out over a vast area, then cools to form a solid crust. Though such incandescent "tidal waves" were once common, only one has occurred in historic times. This happened in Alaska 55 years ago, fortunately in an uninhabited region, and created what is now called the Valley of Ten Thousand Smokes. Left, at the bottom of this valley, glacier-like formations mark the extremity of the ignimbrite flow. Right, a cliff of solidified magma (averaging 100 metres; 330 feet in height).

Photos © Haroun Tazieff

equipment) no more than two or three series of analyses could have been carried out in a year. The problems to be solved in fact require the results of hundreds of analyses for, primarily, what we are trying to do is to detect and follow up variations in composition which we intuitively feel to be important.

It was at this point that two chemists in our team, Dr. I. Elskens of the University of Brussels, and Dr. F. Tonani, of the University of Florence, rightly pointed out that the high degree of accuracy obtained over a mercury trough was not absolutely necessary for our purposes, since it was more important to detect variations and establish relationships between the various constituents than to know their exact composition.

By adopting a new industrial process used for quantitative analysis of traces of gas in offices and factories, we were able to do two analyses a minute and on one occasion when the explosive activity was favourable (i.e., strong enough and at the same time so directed that it was possible to get near to the erupting mouth) we were able to spend more than two hours inside the crater of Stromboli itself and carry out a long series of tests, mainly to determine the amounts of water and carbon dioxide present and with the subsidiary aim of determining the hydrochloric acid content. Although we expected to find fluctuations, the range and rapidity of those we did discover amazed us.

The carbon dioxide content went from 0 to 25 per cent in less than 3 minutes and that of water vapour from 0 to 45 per cent in a similar time and even from 20 to 50 per cent in a few seconds, that is it more than doubled almost instantaneously.

With the hazardous and uncomfortable conditions under which we were working, it was difficult, in addition to taking samples, to note with accuracy the timing of eruptive effects and particularly of explosions. It would seem however, that there is a close connexion between variations in water and carbon dioxide content and the explosive activity of the volcano, although we still do not have sufficient data to draw firm conclusions.

Continuous sampling at very frequent intervals is thus absolutely necessary for a proper study of the problems of eruptive activity. On the other hand, a watch can be kept quite satisfactorily on the fumaroles escaping from a dormant crater, which are obviously subject to infinitely slower varations, by less frequent analyses, the development curve being determined from points obtained at intervals of only one a month or even less.

BUT to reach an understanding of the mechanism of eruptions proper, even our new procedure is insufficient, particularly since it is unusual to be able to stay more than a few minutes or even seconds at a time in a really active crater. In fact the memorable "Operation Stromboli," during which we had several times been peppered with incandescent projectiles (from which our fibreglass helmets gave us very good protection), ended more or less in a scramble for safety after three hours when, following an explosion which had produced a particularly large number of projectiles, the rubber soles on the boots of the most intrepid volcanologist that I know, Franco Tonani, caught fire. We took the hint and left.

Ivan Elskens, who quite properly believes that the mouth of a volcano is no place for any man in his right mind, decided thereupon to apply himself to the realization of our old dream of an instrument capable of carrying out continuous and automatic sampling and analysis of the volcanic gases and transmitting the results to a recording meter situated at a respectful distance from the crater. "Then you can go and mess about near the craters as much as you like," Elskens told us, "and I will make myself comfortable with a glass of beer and a book and just look up from time to time to keep an eye on the meter."

In actual fact, in three years, with the assistance of an electronics expert, Mr. Bara, he succeeded in developing this instrument. On August 29, 1966, on the slopes of the north-east *bocca* of Etna, Elskens, albeit without a glass of beer, used his field telechromatograph for the first time, measuring, to start with, a single constituent of the volcanic gas and recording by remote control the variations in the carbon dioxide content of gases issuing at a temperature of 1,000° from a vent which was belching out molten lava.

It is too early yet to talk about the results of this operation or predict the potential of the new instrument, but I am sure that a very important step forward has been made and that the simultaneous recording of two such fundamental parameters as seismic activity and the composition of the gas given off by an erupting volcano

CONTINUED ON NEXT PAGE

Research funds—the weapon most lacking to volcanologists

will enable us to understand this mysterious phenomenon infinitely better than hitherto.

I would like also to mention the two other new aids to observation and forecasting. One resembles the tiltmeter but provides more easily interpretable data than tilt variations which, especially with volcanoes of the circum-Pacific type, are often misleading.

The method consists of measuring the diameter of a crater by means of a tellurometer. Robert W. Decker, whose idea it was, measured the diameter of Kilauea at fairly close intervals and discovered that it was increasing continuously and quite noticeably right up to the time of eruption.

Before instruments were available to measure distances of up to several tens of kilometres very accurately and very rapidly, such operations were much too slow and expensive to be of practical value in volcanology. It is now quite possible that the Decker method will produce results greatly superior to those obtained by clinometers.

The second method, used for long-range forecasting (several months to, perhaps, several years), is based on a hypothesis deduced by Mr. C. Blot, head of the geophysics section at the ORSTOM Centre, Noumea (New Caledonia), from the relationship which appears to exist between certain deep (550 to 650 kilometres below the surface) and intermediary (150 to 250 kilometres) seismic effects, and certain eruptions in the New Hebrides archipelago.

SINCE submitting the first results of his observations at the General Assembly of the International Union of Geodesy and Geophysics at Berkeley in August 1963, Blot has been applying the relationships which he has discovered to attempted forecasts of the volcanic eruptions in the region of the New Hebrides. In the last three years, the volcanoes Gaua, Ambrym and Lopévi all resumed strong activity on dates forecast months in advance.

In collaboration with Mr. J. Grover, chief of geological survey, Solomon Islands, it has been possible to extend these studies and forecasts to the volcanoes of the Santa Cruz and Solomon Islands (Tinakula and various underwater volcanoes).

At the last Pacific Scientific Congress in Tokyo, September 1966, Blot and Grover presented a paper setting out the results of these forecasts of volcanic eruptions in the south-west Pacific which ended a follows:

"It seems more and more likely that a relationship exists between deep seismic effects, intermediary effects and volcanic eruptions. The relationship between deep effects and eruptions cannot be a direct one, since explosions and lava flows do not originate at depths of 400 to 700 kilometres.

"However, a certain alteration in tensions or an abrupt change of phase at these depths could set off a thermo-energy phenomenon which—in zones where the critical physical conditions obtain, particularly under the volcanic arcs—could cause other rapid changes producing intermediary seismic effects at depths between 250 and 60 kilometres, depending on the regional tectonics. These would be the zones in the upper mantle where the molten pockets occur and where magma forms and where, according to the views of, for example, Dr. Shimozuru and Dr. Gorshkov, volcanic eruptions originate.

"By observing seismic activity in a given area following the start of deep seismic effects and by the detection and localization of intermediary effects beneath volcanic areas, it will be possible to keep a closer watch on one sector or one volcano several months before a possible eruption."

The relationships discovered in the New Hebrides and, with increasing frequency, throughout the Pacific show that there may be a constant interval between the beginnings of phenomena at different levels right up to the surface, if the depth, distances and intensities of these phenomena and other, still somewhat indeterminate tectonic, physical and chemical factors can be taken into account.

These intervals appear to be, on average, from 10 to 14 months between the 650 and 200 kilometre levels (along the line of the 60° inclination of the deep structures of the Pacific arcs) and from 4 to 8 months between the intermediary seismic effects 200 kilometres beneath the volcanoes and the actual eruptions.

If this theory proves true, it would be of the utmost value for the forecasting of possible cataclysms. So far it has not been possible to verify it thoroughly outside the New Hebrides area and, even there, it is a little early yet to draw any final conclusions regarding the reality of these relationships.

Though some questions remain to be answered about the mechanical, physical and chemical processes which determine the upward propagation of endogenic energy at a speed of some hundreds of kilometres a year from the depths up to the neck of a volcano, this link, if it really exists, will certainly be one of the basic criteria in volcanological forecasting in the future.

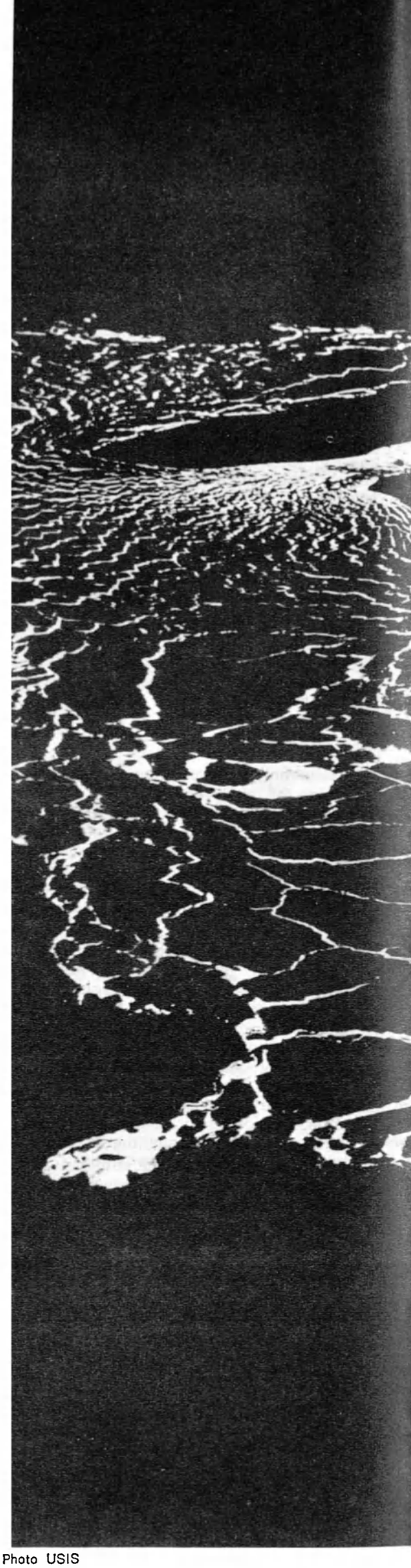


Photo USIS

KILAUEA, THE HELPFUL

Kilauea, on the Pacific island of Hawaii, gives due warning of its eruptions. It is one of the few volcanoes whose behaviour has so far facilitated early forecasts of impending activity. Its eruption in December 1959 was foreseen six months earlier thanks to recorded data which volcanologists used to predict with unprecedented accuracy the place and time of the eruption, thus enabling the local population to be evacuated in time. Photo shows lake of molten lava that fills the Kilauea crater (10 sq. km.: 4 sq. miles in area).

MARIE CURIE

The life of a woman dedicated to science

The story of the life of Marie Curie recounted below is taken from "Madame Curie", the biography written by her daughter Eve Curie, translated into English by Vincent Sheean and published and © 1937 by Doubleday, Doran and Co., Inc, Garden City, New York. Drawing on documents, narratives and recollections of Marie Curie's contemporaries and on the personal notes, letters and journals of Pierre and Marie Curie, the book evokes with insight and understanding the personality, astonishing career and scientific achievements of a woman of whom her daughter wrote: "She did not know how to be famous".

Text © Reproduction prohibited

In a night pierced with whistles, clanking and rattling, a fourth-class carriage made its way through Germany. The carriage had no proper seats. Crouched down on a folding chair Maria Sklodowska, whom the world was to know as Marie Curie, was thinking of the past, and of this journey which she had waited for so long.

She tried to imagine the future. She thought, quite sincerely, that one day she would be making her way back to her native Warsaw, in two years, three years time at the most, when she would find herself a snug little job as a teacher.

It was the winter of 1891. She was twenty-four. And she was on her way to Paris, to the Sorbonne. It had been a hard struggle. To leave the country she loved. To save enough for the fare.

What she wanted above all was to continue her studies, to work. But this was impossible in a Poland, groaning under the heel of Czarist oppression. The University of Warsaw was not open to women. She dreamed of studying in Paris. And eventually, by skimping and saving, she managed to collect enough for her fare.

The moment came when she was stepping from the train on to the platform of the Gare du Nord. For the first time in her life she was breathing the air of a free country.

With that ardency which was part of her nature, Marie flung herself into her new life.

"She worked . . .," her daughter, Eve Curie later wrote in the biography of her mother, "as if in a fever. She attended courses in mathematics, physics and chemistry. Manual technique, the minute precision needed for scientific experiment became familiar to her. Soon she was to have the joy of being responsible for researches, which, though of no great importance, nevertheless allowed her to demonstrate her skill and originality of mind.

"She had a passionate love for the atmosphere of the laboratory, its "climate" of dedication and silence, which she was to prefer to her dying day. She decided that one master's degree was not enough. She would obtain two. One in physics and one in mathematics."

She had built herself a secret universe, dominated by her passion for science. Her love for her family and her country had their place in this universe, but something which had no place, which she had ruled out completely from her life, was that other kind of love, which previously had brought her only humiliation and disappointment. Marriage simply did not come into her scheme of things.

"Perhaps," Eve Curie wrote in her book, "it is not surprising that a young Polish girl of genius, living on the edge of poverty miles away from her native land, should have kept herself to herself for her work. But it is surprising that a Frenchman, a scientist of genius, should have kept himself for that Polish girl."

While Marie, still almost a child, was living in Warsaw and dreaming one day of coming to the Sorbonne to study, Pierre Curie, returning home one day from that same Sorbonne—where he was already making important discoveries in Physics—confided these thoughts to his diary: "Woman loves life for the living of it far more than we do: women of genius are rare. We have to struggle against women when, driven on by some 'mystic' love,

Photo Archives Pierre et Marie Curie

Maria Sklodowska in 1892. She was 24. And she had only been in Paris for a few months. At last her dream of studying science at the Sorbonne had come true. Ten years later she discovered radium and received world acclaim as one of the greatest scientists of modern times.

we wish to pursue some path which is against nature, some work which alienates us from the human beings nearest and dearest to us."

The second son of a physician, Dr. Eugène Curie, Pierre had received no "formal" education. He never went to school. Instead he was taught first by his father then by a private tutor. It was a scheme of education that paid dividends. At the age of sixteen Pierre Curie was a Bachelor of Science. At the age of eighteen he had a master's degree. At nineteen he was appointed laboratory assistant to Professor Desains in the Faculty of Science—a post he held for five years. He was engaged on research with his brother Jacques. The two young physicists soon announced the discovery of the important phenomenon of "piezo-electricity."

In 1883, Jacques was appointed professor at Montpellier, while Pierre became head of the laboratory at the School of Physics and Chemistry of the City of Paris. Even though he devoted much of his time to his pupils, he continued his theoretical work on crystalline physics. This work led to the formulation of the principle of symmetry which has become one of the bases of modern science. He invented and built an ultra-sensitive scientific scale: the Curie Scale. He took up research on magnetism and achieved a result of major importance, the discovery of a fundamental law: Curie's Law.

This was the man whom Marie Sklodowska was to meet for the first time in the beginning of 1894.

"He seemed very young to me," she noted, "although he was then thirty-five. His rather slow, reflective words, his air of simplicity and his smile, at once serious and young, all inspired confidence. A conversation began between us and we became friendly; its object was some questions of science upon which I was only too happy to ask his opinion."

Pierre Curie later recalled their meeting in these words: "I described the phenomenon of crystallography upon which I was doing research. It was strange to talk to a woman of the work one loved, using technical terms, complicated formulae, and to see that woman, so young and so charming, become animated, understand, even discuss certain details with an astonishing clarity.

"I gazed at her hair, at her high curved forehead and her hands, which were already stained from the acids of the laboratory and roughened by housework. I dug into my memory for all that had been told me about this girl. She was Polish. She had worked for years in Warsaw before being able to take the train to Paris; she had no money; she lived alone in a garret..."

In the July of 1895 Pierre and Marie Curie were married.

"During these happy days was formed one of the finest bonds that ever united man and woman", Eve Curie wrote. "Two hearts beat together, two bodies were united and two minds of genius learned to think together. Marie could have married no

CONTINUED ON NEXT PAGE

other than this great physicist, this wise and noble man. Pierre could have married no woman other than the fair, tender Polish girl, who could be childish then sublime within the same few moments : for she was a friend and a wife; a lover and a scientist.

In July 1897 their first child was born. Irène Curie was to follow in her mother's steps. She took up a scientific career, married a fellow scientist, the physicist Frederic Joliot and in 1932, succeeding her mother she became director of the Radium Institute in Paris. In 1935 Frederic and Irène Joliot-Curie shared the Nobel Peace Prize in Chemistry.

At the end of 1897 the balance sheet of Marie's achievements could show two university degrees, a fellowship and a monograph on the magnetization of tempered steel. The next logical step in her career was a doctor's degree. Reading through reports of the latest experiments Marie was attracted by a paper published by the French scientist, Henri Becquerel.

Becquerel had examined the salts of a rare metal, uranium. After Röntgen's discovery of X-rays, the French scientist, Henri Poincaré, conceived the idea of discovering whether rays like the X-ray were emitted by fluorescent bodies under the action of light.

Attracted by the same problem Becquerel examined the salts of uranium. He observed, instead of the phenomenon he had expected, another altogether different and incomprehensible. Without exposure to light, uranium salts emitted, spontaneously, some rays of an unknown nature. A compound of uranium, placed on a photographic plate surrounded by black paper, made an impression on the plate through the paper.

Becquerel's discovery fascinated the Curies. They asked themselves where the energy came from, the energy which uranium compounds constantly gave off in the form of radiation. And what the nature of this radiation was. Here, indeed, was a subject worthy of research, of a doctor's thesis.

All that remained was the question of where Marie was to do her experiments. After certain difficulties, Marie was given the use of a little glassed-in studio on the ground floor of the School of Physics. It was a kind of store-room, sweating with damp, where discarded machinery and lumber were locked away. Its technical equipment was rudimentary, its comfort non-existent. Deprived of an adequate supply of electricity and of everything that normally forms material for the beginning of scientific research, Marie, however, kept her patience. She sought and found a means of making her apparatus work in this hole.

And it was under these primitive conditions, on the ground floor of the School of Physics in the Rue Lhomond in Paris that two new elements were discovered : polonium and radium.

But nobody had seen radium, nobody knew its atomic weight. The chemists were sceptical. "Show us radium," they said, "and we will believe you."

To show polonium and radium to the sceptics, to prove to the world the existence of their two new elements, and to confirm their own convictions, Pierre and Marie Curie were to labour for four more years... in a wooden shack, an abandoned shed, which stood across a courtyard from Marie's original work-room. This shed had once been used by the Faculty of Medicine as a dissecting room, but for a long time it had not even been considered fit for a mortuary.

"We had no money, no laboratory, and no help in carrying out this important and difficult task," Marie later recalled. "It was like creating something out of nothing. I may say, without exaggeration, that for my husband and myself this period was the "heroic" period of our lives. And yet it was in that miserable shed that the best and happiest years of our lives were spent — devoted entirely to work. I some-

CONTINUED ON PAGE 18

The rarest, most precious vital force

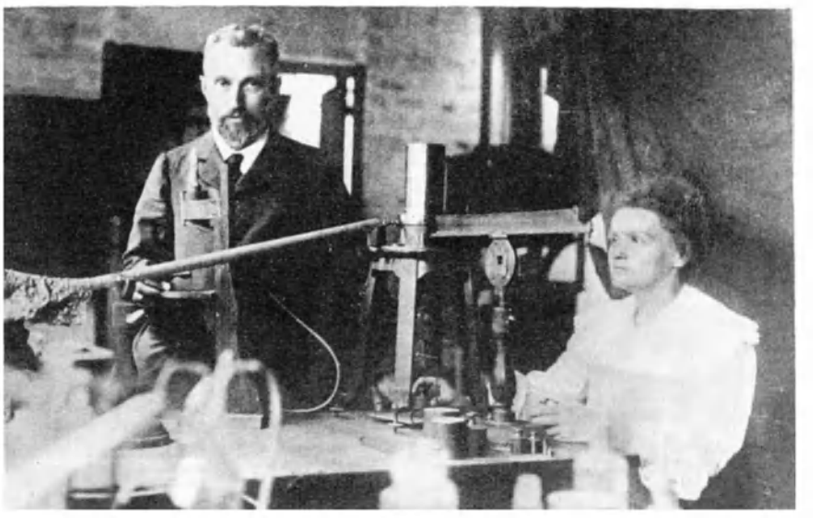
by Marie Curie

On May 15, 1922 the Council of the League of Nations in Geneva unanimously named Marie Curie a member of the League's Committee on Intellectual Co-operation, of which she later became vice-president. On June 16, 1926 Marie Curie presented to the Committee a memorandum on international scholarships for the advancement of science. In it she discussed the problems of working conditions in laboratories and the encouragement of scientific vocations, and outlined a plan for the promotion of international scholarships in science. The following is the preamble of the memorandum.

I shall devote but few words to an affirmation of faith in the importance of science for mankind. If at times this importance has been questioned and if the words "the failure of science" have been pronounced in moments of bitter discouragement, it is because man's endeavours to achieve his highest aspirations are never perfect, like all that is human, and because these endeavours have too often been diverted from their path by forces of egocentric nationalism and social regression.

Yet it is through the constant effort to expand science that man has risen to his present pre-eminent place on our planet and that he is also winning increasing power over nature and a larger measure of well-being. We should join with those who, like Rodin, pay homage to the devoted efforts of scholars and thinkers and with those who, like Pasteur, "believe indomitably that science and peace will triumph over ignorance and war".

If, to judge from the experience of the recent world conflict, the aspirations of the elites in different lands often appear less exalted than those of the great mass of less well educated persons, it is because of the perils inherent in all forms of intellectual and political power when these are not controlled and channeled toward the high ideals which alone justify their use. No enterprise can therefore



THE FAMILY OF FIVE NOBEL PRIZE WINNERS

In 1903, Marie Curie and her husband Pierre (above) received, with the French scientist Henri Becquerel, the Nobel Prize for Physics. Marie Curie was the first woman to receive a Nobel Prize. In 1911 she was also the second woman so honoured for scientific achievements, being awarded the Nobel Prize for Chemistry. And when a Nobel Prize was given to a woman scientist for the third time, it went to Marie Curie's daughter, Irene who, with her husband Frederic Joliot (photo right) was awarded the Nobel Prize for Chemistry in 1935. Since then three women scientists have been named Nobel Prize winners: U.S. scientists Gerty T. Cori (Medicine, 1947) and Maria Goeppert Mayer (Physics, 1963) and U.K. scientist Dorothy Crowfoot-Hodgkin (Chemistry, 1964).

Photos Archives Pierre et Marie Curie.

have greater importance than those which seek to promote international ties between the dynamic thinkers in all countries and especially between the young in whose hands lies the future of mankind.

I am sure that no one will deny that even in the most democratic of countries existing social systems offer a considerable advantage to the wealthy and that the roads to higher education, open so freely to children of families with ample means, are still difficult of access to children of families with limited resources.

As a result every nation each year loses a large part of the rarest, most precious vital force. While waiting for reforms in education to resolve this problem once and for all, the democratic response in various countries has hitherto consisted of a partial remedy, the creation of national educational scholarships, thus enabling higher education to retrieve some of the young people of whom it would otherwise be deprived.

These national efforts, highly commendable though still far from adequate, are not our concern here, but I would like to point out that the same problem exists with regard to post university studies for the young people who have managed to surmount all the obstacles encountered up to that point.

At this post-university stage of their lives, young students who contemplate careers in science are brought face to face with pressing demands. In most cases the family has done its utmost to help the young man or woman to come this far and, unable to make further sacrifices, it now asks them to become self supporting. And even in well-to-do families the wish to take up very advanced studies may encounter a lack of understanding, such studies being considered as an extravagance or a mere whim.

Yet what in fact are the best interests of society in this matter? Should it not give every encouragement to those called to a scientific vocation? Is it really so well-endowed that it can afford to reject the vocations it is offered?

I believe, on the basis of personal experience, that the sum total of the aptitudes called for by a true scientific vocation is an infinitely frail and precious thing, a rare treasure that it is both absurd and criminal to throw away, a gift to which great care must be devoted so that it may grow and fructify.

What, in reality, are some of the qualities required of the person who aspires to success in the field of independent scientific research? The intellectual qualities are an intelligence capable of learning and understanding; a sure judgment capable of appraising the significance of theoretical and experimental demonstrations, an imagination capable of creative effort. Equally important are the moral faculties: perseverance, zeal and above all the unselfish dedication that guides the novice along a path which, in most cases, will never lead him to material rewards comparable to those offered by careers in industry or business.

Thus to foster and safeguard the scientific vocation is a sacred duty for each society which has the interests of its future at heart. It is gratifying to see that public opinion is becoming increasingly conscious of this duty.

times passed a whole day stirring a boiling mass of pitchblende, with an iron rod almost as big as myself. In the evening I would be broken with fatigue."

It was in 1902, forty-five months after the day on which the Curies had announced the probable existence of radium, that Marie finally succeeded in preparing a decigramme of pure radium. She made a first calculation as to its atomic weight — 225.

Now the sceptics—of which there were still a few—could only bow before the facts, before the superhuman obstinacy of a woman who had performed one of the great scientific feats of the century. Now radium *officially* existed.

Marie and Pierre were to have four more years together, four years during which radium became an industry, was used in the field of medicine to cure growths, tumours and—most important—certain forms of cancers: another daughter, Eve, was born; in 1903 the Curies received, with Henri Becquerel, the Nobel Prize for Physics; the name Curie became world-famous.

Then one rainy morning in the April of 1906 Pierre was making his way home up the Rue Dauphine. Crossing the street, he was killed when the back wheel of a horsedrawn wagon passed over his skull.

On that day in April, Madame Curie became, not only a widow, but a pitiful and incurably lonely woman.

What was to become of her now? What was to become of the research Pierre had left in suspense, and of his teaching at the Sorbonne? On May 13, 1906, the council of the Faculty of Science decided, unanimously, to maintain the chair created for Pierre Curie and offer it to his wife.

In 1911, Marie Curie was awarded the Nobel Prize for Chemistry. In 1912, she was created Member of the Scientific Society of Warsaw. In 1913 she became Member Extraordinary of the Royal Academy of Sciences (Mathematics and Physics section) Amsterdam; Doctor of the University of Birmingham and Honorary Member of the Association of Arts and Sciences of Edinburgh. In the same year she attended in Warsaw the opening of the radioactivity laboratory, dedicated to her.

In the following year, a small white building was completed in the Rue Pierre Curie in Paris. Cut into the stone, above its entrance, were the words: *Institut du Radium, Pavillon Curie*. This "temple of the future" was now ready to receive its radium, its workers and its director.

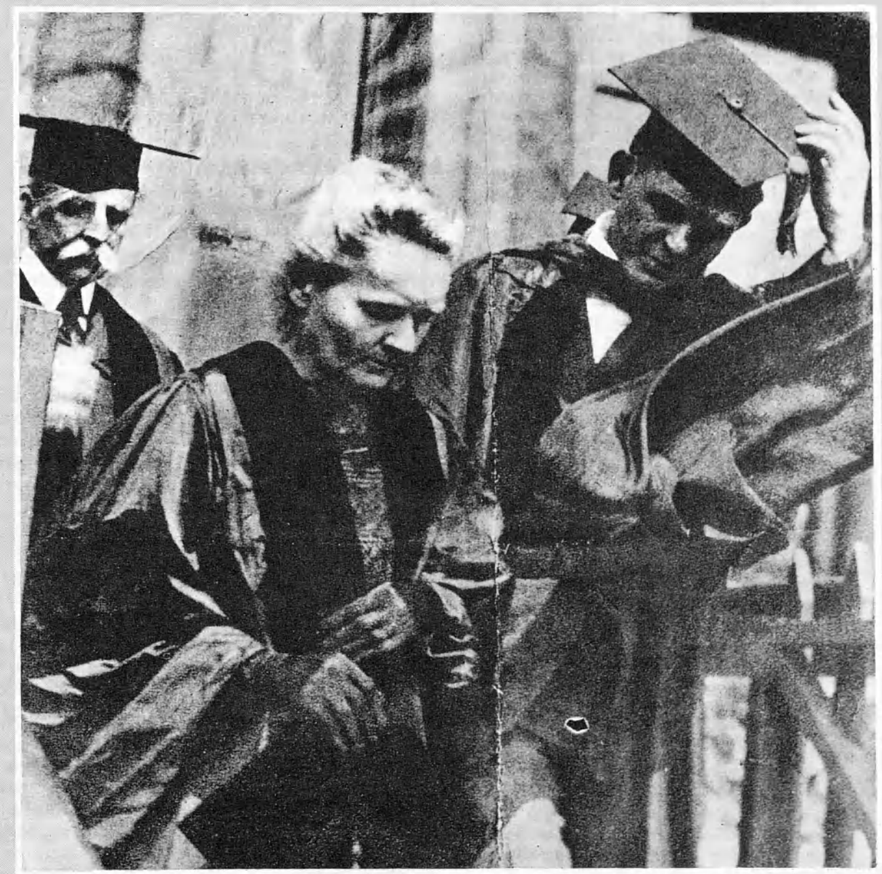
With the outbreak of the First World War, Marie Curie foresaw the urgent need to organize the manufacture of

CONTINUED ON PAGE 20

in 1895, after studying at the Sorbonne for four years, Maria Sklodowska, the Polish student, married Pierre Curie, the French physicist (left). Until Pierre's death in 1906 they pursued, with the same intense passion, what Pierre once called "our scientific dream". Their eleven years together, working with only bare necessities, produced a phenomenal result: the discovery of polonium and radium. Above, the makeshift laboratory in which Marie Curie succeeded in producing the first decigrammes of the mysterious white metal: radium.

Marie Curie at the wheel of one of the radiological cars she put into service during the First World War. More than one million wounded soldiers were examined in the 20 cars and 200 fixed posts created by Marie Curie.

YEARS OF HAPPINESS, WORK AND TRIUMPH



In 1921, seated in a chair and encircled by reporters and cameramen, Marie Curie arrives in New York. A retiring woman, she now underwent the ordeal of being famous. To thank the United States for the gift of a gramme of radium, she had conquered her fears and for the first time in her life she accepted the obligations of a great official journey. She was the discoverer of radium, but lacked the means to produce it in the quantity needed for her research.

At the University of Columbia, in the United States, Marie Curie advances to receive the honorary degree of Doctor of Science. She was then aged 54. During her lifetime she was so honoured twenty times by universities in the U.S.A., Britain, Poland and Switzerland.

All photos Archives Pierre et Marie Curie

Röntgen apparatus as well as the need for radiological cars. She equipped and put into service 20 of these cars, retaining one for her personal use. She asked no special favour. She who had once nearly starved in a garret did not find it difficult to transform herself into a frontline soldier.

In 1922, 35 members of the Academy of Medecine of Paris submitted the following petition to their colleagues: "The undersigned members think that the Academy would do itself honour by electing Madame Curie as a free associate member, in recognition of the part she took in the discovery of radium and of a new treatment in medicine, Curiotherapy."

This was a revolutionary document. Not only was it proposed to elect a woman for the first time to a scientific academy in France, but, breaking with custom altogether, it was proposed to elect her spontaneously, without her formally submitting herself as a candidate. Sixty-four members of the Academy of Medecine signed this manifesto — thus giving a lesson to their brethren in the Academy of Sciences. All candidates to the vacant chair retired in favour of Madame Curie.

In the September of 1927—in her sixtieth year—and not long after an operation to stem the onset of blindness, she wrote to her sister, Bronya: "Sometimes my courage fails me and I think I ought to stop working and devote myself to gardening. But I am held by a thousand bonds, and I don't know when I shall be able to arrange things differently. Nor do I know whether, even by writing scientific books, I could live without the laboratory."

Madame Pierre Curie died on July 4, 1934. She was 67. The cause of her death was an aplastic pernicious anaemia. The bone marrow did not react, probably injured by a long exposure to radiation. At the end she did not call on her daughters, Irène or Eve, or on any of her relations. At the end she was alone with the scientific work to which she had devoted her life.

A year later, the book Marie had completed just before her death, was added to the library of the Radium Institute in the Rue Pierre Curie. It was a heavy volume. On its grey cover was the name of the author: Madame Pierre Curie, Professor at the Sorbonne. Nobel Prize in Physics. Nobel Prize in Chemistry. The title was one word: "Radioactivity".

As her daughter Eve said of her: "She was an eternal student; she passed like a stranger across her own life. She remained whole, natural and almost unaware of her astonishing destiny. She did not know how to be famous."

Photo Centralna Agencia Fotograficzna, Warsaw

MARIA SKLODOWSKA
The Dreamer in Warsaw

by Leopold Infeld

BEFORE the last war, in Warsaw, near the Vistula River stood the castle of the Polish kings which served as the residence of Poland's presidents between the two world wars. Nearby lay the Old Town with its medieval buildings, known from the pictures by Canaletto (See the "Unesco Courier", March 1961). Near the Old Town was the "New Town", built a little later.

The last war destroyed the castle, the Old Town and the New Town even more thoroughly than the rest of Warsaw which was almost completely obliterated by the Nazis.

The present government decided to rebuild the Old and the New Town exactly (at least externally) as they were in the times of the last Polish king and are known from old pictures and plans. Thus for a man born a hundred years ago, the rebuilt Old and New Town would seem stranger than to someone born 200 years ago.

In the New Town there is a small thoroughfare called Freta Street, and at number 16 a plaque records that in 1867 Maria Sklodowska was born there. One hundred years ago—that is, four years after the last Polish Uprising was crushed. Afterwards Czarist repression became even stronger than before, as did the patriotic feelings of the Poles.

The mother of Maria ran a small private school at 16 Freta Street and her husband, Wladyslaw Sklodowski, was a secondary school teacher of mathematics and physics. Maria's parents were members of the small Polish gentry. They formed a closely

---

LEOPOLD INFELD, *a leading Polish physicist and a member of his country's Academy of Sciences, is head of the department of theoretical physics at the University of Warsaw and director of the Institute of Theoretical Physics. From 1933 to 1935 he was at Cambridge University where he collaborated with the famous physicist Max Born. From 1936 to 1938 he was at Princeton University where he worked with Professor Albert Einstein and from 1938 to 1950 he was lecturer and then professor at Toronto University. He is the author of numerous scientific books, among them: "The Evolution of Physics", which he wrote with Albert Einstein.*

In this section of Warsaw's "New Town" (destroyed during the last war and completely rebuilt since 1945), Maria Sklodowska was born and spent her youth. Later, when she became Marie Curie, she wrote in her autobiography of those early days: "I devoted most evenings to my own education. I had heard that a certain number of women had managed to enter schools of higher education in St. Petersburg or abroad and I determined to prepare myself to follow them one day."

knit family in which there were five children, four of them girls—Zosia, Maria, Bronia, Helena—and one son, Joseph. All, with the exception of Helena Sklodowska Szalay, died before the last world war.

There must have been a really cultured atmosphere in the Sklodowski home. Let me quote a passage from the biography of Maria Sklodowska Curie by her daughter, Eve Curie, who writes:

"It was true that Mr Sklodowski knew everything, or nearly everything. The poor man, father of a family, balancing his budget with the greatest difficulty, had found leisure to develop his scientific knowledge by going through publications which he procured by considerable effort. It seemed to him quite natural to keep up with the progress of chemistry and physics, just as it was natural to know Greek and Latin and to speak English, French and German (as well as, of course, Polish and Russian); to translate the finest works of foreign authors into his native language in prose or verse..."

The family often moved house, depending on the state of their finances. Nowolipki, Karmelicka and Leszno Streets appear in the early biography of Maria. Before the last war I knew these streets well. They were in the heart of the Jewish district. They were ugly, narrow cobble-stoned streets, often jammed with horse-drawn droskies filled with merchandise.

In the Russian gymnasia (high schools) which prepared students for the University, pupils were not allowed to talk to each other in their mother tongue. They were not allowed to do so even in the street. Polish was treated and taught as a foreign language. If someone was found guilty of the "crime" of speaking Polish he was denounced and punished by solitary confinement. A second offence led to a beating and if it happened for the third time the culprit was expelled from the school and no other school could accept him. But the attempts of the Czarist authorities to Russify Poland by such draconic laws proved a completa fiasco.

Some Polish students attended private schools, at least for the beginning of their education. The young Maria went to Jadwiga Sikorska's school for girls at the corner of Marszalkowska and Królewska Street. Schools like this which did not give the right to enter university, were centres of Polish patriotism and organized resistance.

At a moment's notice, when a certain bell rang in the class—a warning that the Czarist inspector had come to visit the school—everything changed in a few seconds as if by magic. A patriotic lesson in Polish history would suddenly become a lesson on mathematics conducted in Russian. Such changes were made easier by the rottenness and corruption of the Czarist Regime. Almost all the inspectors were ready to take bribes, usually handed to them between the covers of a book.

MARIA was the best student in her class. In order to enter any university anywhere she also had to finish the hateful gymnasium—which she did, winning a gold medal when she was barely 17 years old. The Czarist university at that time did not accept girls. In any case, few Poles attended it and from 1905 there was an organized boycott of all government schools, including the university.

Yet it was impossible to curb the Polish spirit of learning. As they did 60 years later under the Nazi occupation, the Poles organized a "university on the run": classes were held secretly, each time in a different home. The students also brought education to the workers. The young people around Maria felt that what the people of Poland needed most was education.

It was the era of Positivism in literature and the time when Polish youth rebelled against Romanticism. They were influenced by philosophers like Auguste Comte and Herbert Spencer; they recognized the importance of the work of great scientists such as Pasteur and Darwin. Maria was also influenced by this trend. Indeed, we know from a letter to her father that she read Spencer's books on sociology in French and "a wonderful book on anatomy and physiology by Paul Bert in Russian."

Maria Sklodowska was 18 when her older sister Bronia went to Paris to study medicine.

It is perhaps worth mentioning that while in Paris Bronia met and married Doctor Dluski, and that after they returned to Poland the young couple established a sanatorium in Zakopane. This health resort, lying in the beautiful Tatra Mountains later became a vacation resort for Pierre and Maria Slodowska Curie, who were among the first to discover Zakopane, now known as "the pearl of Poland".

While Bronia was in Paris, her father, on his salary as a school teacher, was unable to go on supporting the burden of paying for his daughter's studies. Maria agreed to help, and a position of governess was offered to her by the Zurawski family.

During the holidays the Zurawski's eldest son Karol came home from the University where he was studying mathematics. A love-affair began between Maria and Karol. Maria had beautiful platinum blond hair, gray, sparkling eyes, and a determined mouth. Karol was the first young, well educated man in whom she had become interested.

But a marriage between the daughter of a gymnasium teacher and the son of a landowner was regarded in 19th century Poland, as in most of Europe, as a "mesalliance". The parents of the boy did not give their consent.

I met Karol Zurawski when he was about 50; I was around 20 and a student at the Jagellonian University, Cracow, where he was then a professor of mathematics.

He was a good mathematician and there is still a theorem in hydromechanics known by his name. I saw him even after the Second World War in Warsaw, where he had moved from Cracow, and where he died, twenty years after Maria's death.

CONTINUED ON NEXT PAGE

Maria's interest in mathematics started just at the time when she met him. She was always very capable and had a good memory. But I believe her friendship with Karol showed her the first vista of the beauty of mathematics.

If one once understands Mathematics and Physics, one becomes their slave and lover for the rest of one's life —as did Maria Sklodowska.

When she returned to Warsaw she worked for some time in the Museum of Industry and Agriculture. There, under the guidance of her relative Joseph Boguski, who later became a professor at the Warsaw Polytechnic, the young girl enjoyed her first experiments in physics and chemistry.

Because of the disappointment of her first love, because of her awakened interest in Science and because Russian universities were closed to women, Maria decided to go to Paris in 1891 and to study there. She intended to return to Poland as a qualified teacher in mathematics and physics. Although fate interfered with her plans, she was always in close touch with her family and with her country, which she visited many times.

IN May 1912, after the death of her husband, and after the Curies had received the Nobel Prize, à Polish delegation was sent to Paris. Among its members was the famous writer Henryk Sienkiewicz, author of "Quo Vadis", who urged Maria to return to Warsaw to continue her scientifio work there.

Maria's daughter writes that it was a difficult decision for her to take. But I find this hard to believe. Warsaw was then a desert as far as experimental physics was concerned, and no experimental scientist can work in a desert. She promised, however, to direct from afar the new laboratory that was planned and she recommended for posts on its staff her two most talented Polish students, Jan Danysz and Ludwik Wertenstein.

The laboratory was opened in August 1913. Money had been provided by an industrialist who wished the laboratory to be named after his son, a pupil of Maria's in Paris, who had died as a young man. So the laboratory, named for Dr. Kernbaum, was created, and for its inauguration Maria visited Poland and gave a lecture in Polish.

The history of this laboratory, belonging to the " Learned Society of Warsaw", and the role it played in the scientific development of Poland deserve a few words.

Jan Danysz, one of the Polish students recommended by Maria, was killed a few years later in the Battle of Verdun. His son is now a distinguished physicist in Warsaw, and is the co-discoverer, with Jerzy Pniewski, of the fundamental particles known as hyperons.

The laboratory was directed by Professor Wertenstein, undoubtedly the most distinguished but officially the least recognized experimental physicist in Poland of the generation between the world wars. It had little or no State support, though in 1921 it received an important grant from Maria. Yet, because of its scientific work and because of the schooling it gave to a few young scientists, it became known throughout the world as the only laboratory in which studies on nuclear physics were kept alive in Poland.

When, after the First World War, a free Poland was created, Maria dreamed of building a big institute in Warsaw devoted to research on radium and its power for healing. But the new-born country spent vast sums on its military preparations and it was left to a specially organized society to collect money and to present the Institute as "a national gift" to Maria Sklodowska Curie.

In 1925 Maria came to Warsaw to lay the corner-stone for the laboratory building, and in 1932, when the hospital at the Institute was finished, Maria again came to Warsaw to present the Institute with a gramme or radium which she had received in the U.S.A

Two years later Maria died, and seven years later night fell on Europe.

Science is an international venture. There is no English, French or Polish Science. But there are contributions of each country to the development of science, usually commemorated by the names of the men responsible for each gigantic step forward.

On its way science smashes old dogmas, looking for new truths. The dogma of the Moving Sun was demolished by the work of Copernicus, Gallileo, Kepler, Newton, Laplace, Einstein. It would be idle to ask who was the greatest. But the first of them was Copernicus.

The dogma that the atom is the indivisable, smallest part of matter was smashed by Pierre and Marie Curie, by Irène and Frederic Jolliot-Curie, by Sir Ernest Rutherford, Niels Bohr, and a hundred others who came after them. But the first were Pierre and Marie Curie.

Poland can be justly proud to have given to the world Copernicus and Maria Sklodowska Curie.

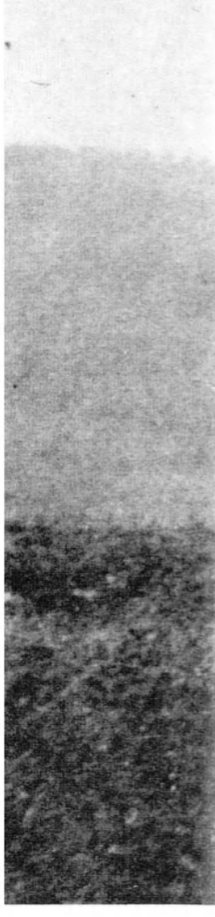


Photo Archives Pierre et Marie Curie

This photo, taken near Geneva on a misty day in 1925, records a meeting between two great scientists —Marie Curie and Albert Einste'n—during a break between meetings at the League of Nations. In 1922 the Council of the League of Nations unanimously named Marie Curie as a member of the Committee on Intellectual Co-operation. In this committee she worked ardently to promote the development of science devoted to the service of man (see text page 16).

THE WOM

by Marguerite Perey

Marguerite Perey, the distinguished French woman scientist, was a research student of Marie Curie's and later collaborated with her for some years. Here she recalls the feelings which Marie Curie inspired in all who worked closely with her, and acknowledges the debt which her own career in science owes to her illustrious teacher. Five years after the death of her "patronne", Marguerite Perey herself discovered a new radioactive substance, francium. Today she is professor in the Faculty of Science at the University of Strasbourg, where she directs the nuclear research centre (nuclear chemistry).

IN June 1929, as a shy young student not yet twenty, I had to face an interview with Madame Curie, who had asked the Chemistry School to choose a new graduate to work with her.

I was shown into a cheerless little waiting-room, where I was quietly joined by a lady in black, very pale and frail-looking, with a chignon of curly grey hair and thick spectacles. I at first took her for a secretary, but

AN WE CALLED 'LA PATRONNE'

to my great confusion, I soon realized that I was face to face with "Madame Curie". We talked for a time, and I felt I was showing up very badly; then she said, "I will let you know in the course of the summer whether the research fellowship has been granted or not."

I considered this a most polite way of dismissing me, and gave an immense sigh of relief when I crossed the threshold of the august institution, for what was, I was convinced, the first and last time: I had been struck by the general dreariness and gloom, and was delighted to think that I had certainly forfeited any possibility of a second visit. I went on holiday with a light heart, until I received a letter from the *Institut du Radium* informing me, to my stupefaction, that the fellowship had been granted, and I was to join the Laboratory on October 1, 1929. Such was the start of my career in the Curie Laboratory.

Madame Curie herself, the friendly atmosphere and the fascinating work so completely won me over that the few months' research work I expected to put in stretched to twenty years.

In Paris, I first had to be initiated into methods of work and scientific problems of which I was totally ignorant. The big chemistry room, facing the redoutable waiting-room of my first visit, looked full South towards the garden on the other side. It became a sort of wonderland for me, thanks to the help and encouragement I received from all who guided my first steps in "Radioactivity" —a field which embraced both chemistry and physics.

Madame Curie loved to have a happy, young and eager team around her, although our eagerness might sometimes break out in slightly noisy, emphatic or surprising forms.

She loved to mix with us and share our life. Our favourite meeting-place was in the passage, facing her office door, at the foot of the stairs. We talked about everything under the sun, whether or not it had any connexion with our work; but I think the talk opened up vast horizons for us. We usually ended by discussing some scientific article which had just appeared.

The garden was another spot beloved of Madame Curie, where she liked to work with one of us or bring us all together. "Her garden" was a very modest affair, between the "Curie Building" and the "Pasteur Building", where she had planted limes and rambler roses when the Radium Institute was established. It was furnished with spartan chairs, benches and tables, and Madame Curie planned any number of experiments with us in the garden, which she preferred to her office.

Receptions for guests of honour or new Doctors of Science were held there when weather permitted. We prepared everything ourselves, and tea and ices were served in beakers with glass rods.

Once I was acclimatized, I was appointed as assistant to one of the research scientists. We worked in the "Little Building", and I spent years behind its thickly-barred windows, for this isolated building held the precious, dangerous stocks of radium and other concentrated radioactive products.

Madame Curie would often tell me what results she expected, but I had to give her the exact results I had obtained, after repeating each experiment several times. She prized integrity and enthusiasm above all else, and as she trusted me, I very soon had the immense privilege of working with her.

Everything needed for a delicate experiment had to be prepared under her watchful eye, and nothing overlooked. It was marvellous training to work under her supervision and benefit from her advice and commentary. It was an ample reward for quickness and skill when a substance of a high degree of purity could be prepared and used.

Marie Curie was the first woman to be admitted as Professor at the University. It was in 1906, after the death of Pierre Curie, that she found the courage to carry on her husband's teaching at the Sorbonne, and pursue their researches.

I only knew Marie Curie in her last years, when radiation had already taken its toll, and she was worn out. Her classes made great demands on her. If there was some special point

CONTINUED ON NEXT PAGE

she wished us to understand, her even tone would become resonant, her deathly pallor would light up.

She was obviously most interested in the experimental periods which followed her classes; but it was with her research team that she showed herself a surpassing teacher. She exacted fervent enthusiasm and dogged persistence. Those who were not imbued with the spirit of her laboratory did not stay long.

I owe an immense debt of gratitude to Marie Curie. If she realized, when we were working together, that I had lost the thread of her explanations, she would go over the ground again, and would tactfully "forget" to check the relevant pages in my notebook. But she made sure, during the next few days, that I had worked at and fully understood them, before going on to the next step.

Marie Curie often brought us together in the lecture-room, where one of the team would explain his work. In the early days, I found this a most unusual and arduous exercise, but Marie Curie could always breathe life into it. She was close enough to us to understand and feel our joy at success, and our disappointment at failure.

To the very end, in spite of all difficulties, she had the gift of wonder. As she put it, "I am one of those who see great beauty in science. A scientist in his laboratory is not a mere technician; he is also a child watching a spectacle of natural phenomena which move him as deeply as a fairy tale. Nor do I believe there is any danger of the spirit of adventure dying out: the most vital force I see when I look around me is that very spirit of adventure, that indestructible urge akin to curiosity."

In spite of every care, protective measures were very inadequate at that time, and the danger of certain substances which we often manipulated was still not fully understood.

In June 1934, Madame Curie, already very ill, was taken to Sancellemoz, where she died on July 4. Her death, which robbed us of "La Patronne," as we lovingly and deferentially called her, was a cruel blow.

I have tried to keep faith with Marie Curie, and continue research in the field she opened up, as I promised her. Before leaving for Sancellemoz, she told me to make all preparations to obtain the emission spectrum of actinium in Professor Zeemars' Laboratory at Amsterdam, which had all the necessary apparatus.

I had to get all the products and equipment ready at Amsterdam, and she was to be there for the experiment when the day came... The following autumn, with the help of the laboratory staff, we were able to carry out this experiment by which Madame Curie set such store, and which was, I believe, the culmination of her last experimental work.

RUBEN DARIO

and the resurrection of Hispano-American poetry

Portrait of the great Spanish American poet by José Lamuño.
Collection Luis Felipe Ibarra, Paris

by
Emir Rodriguez Monegal

A century has passed since Rubén Darío was born in a little town in Central America—and during those hundred years, the child born in Metapa, Nicaragua, has become the most celebrated poet of the Spanish-speaking world, triumphing on both sides of the Atlantic, and dying at the height of his fame to become immortal in his verse, with the other great Spanish poets. During those hundred years, the antiquated, provincial poetry of a whole continent was changed by the force of his genius into the new, vigorous poetry of a score of modern peoples.

When Darío was born, Nicaraguan poetry was practically non-existent, Spanish American poetry was known in Spain only to the erudite, the poetry of Spain itself was dying under the weight of tradition, lassitude and repetition. Darío changed all that in the space of a few years. Striding from Nicaragua to Santiago de Chile, from Chile to Buenos Aires, from the shores of the Plata to Madrid, Darío took the provincial, wandering, sluggish stream of verse and transformed it to a pure current which sings and dances, flaunts its native or borrowed brilliance, and delights in its own distinctive music. That music is still to be heard.

The success of Dario's first notable works, from *Azul...* to *Los raros* and *Prosas profanas*, in the torpid years of the late nineteenth century, scored a victory for the refinements of a literature that was deliberately and unashamedly literary. Darío (the Spanish American) sang to the marquises and princesses of Versailles, delighted in the play of words, was shockingly frivolous.

It was a gentle air, of slow [measures:
the Fairy Harmony timed its [cadences,
and half-formed phrases and gentle [sighs
mingled with the sobs of the ['cellos (1).

It is a joy to follow the intricacies of the lines which echo with the rippling laughter of the Marquesa Eulalia. With these and other poems, Darío came to symbolize the emulation of all poets in the New World for the elegance and refinement of the modernists.

At that time, Paris was the capital of their frivolous, luxurious world: Darío's poetry mirrored as closely as it could the lustre of Paris. Many eminent critics reproached him for his gallic mentality, and bade him (with a certain solemn officiousness) return to his own country to describe "the girls of his village," and try to forget Paris "where he had spent perhaps two or three weeks in his life."

Other critics maintained, on similar grounds, that Darío was *not* the bard of Spanish America, but merely an uprooted foreigner. Many viewed his poetry as a mere projection of Verlaine and Leconte de Lisle, a strained adaptation of the inventions of Poe or Mallarmé, the frothy tribute of an admirer of French exoticism. As a great Spanish writer put it: "In Darío, you can see the Indian feathers showing under his hat," implying that he, like the Indians, was dazzled by the latest European notions.

But the unjust quip of the great Don Miguel de Unamuno touches only the superficial Darío. His visits to Paris, his active involvement with the diplomatic world, his thirst for luxury and worldly success, seemed to justify such strictures. Darío gave the impression of being the typical Latin American poet, stifling in our rude lands, who cannot abide the "crass municipal" populace (as he once called it), and has no aptitude for paying tribute to a new-born democracy or a President of a Republic.

This incomplete, synthetic, fanciful image was thus imposed on many critics and readers. Darío himself gave it currency, with a mixture of amusement and childish impudence. He wished to outdo the subtle in subtlely, explore the farthest bounds of the decadent civilization of his time, and he loved to scandalize the worthy bourgeoisie of Latin America. He wrote defiantly in his introduction to *Prosas profanas:*

> *"Is there a drop of African, Chorotegan or Nagrandanian Indian blood in my veins? There may be, in spite of my aristocrat's hand; but lo! my verses sing of princesses, kings, empires, visions of far-off or impossible countries. What would you? I detest the life and times I chanced to be born to; and I cannot acclaim a President of the Republic in the tongue in which I would sing to thee, O Halagaba!! whose court of gold, silk and marble I visit in my dreams..."*

Those who regarded Darío as a mere imitator of the French school overlooked his other achievements, which were perhaps more important than the trivial aping of Verlaine or Banville. Darío came to Latin American literature at the critical moment in the development of a new cultural tradition. For nearly a century, that literature had been struggling to attain an identity to match the continent's political independence. The romantics (who flourished practically throughout the nineteenth century) were succeeded by the "fin-de-siècle" poets, who struck the first blows, in their separate countries, for more subtle and flexible verse, freer utterance, newer and bolder images.

They were Mexican, like Salvador Díaz Mirón and Manuel Gutiérrez Nájera, Cuban, like Julián del Casal and José Martí, Colombian like José Asunción Silva or Salvadorian like Francisco Gavidia. Each played his part in renovating the Spanish language and Spanish verse; but the only one who was acquainted with them all, learnt from them all and surpassed them all was Rubén Darío.

Genius that he was, he absorbed the spirit of different generations of poets and fused their many tongues into the unique, matchless, highly distinctive voice of one poet: Rubén Darío. This was his first feat: to

CONTINUED ON NEXT PAGE

EMIR RODRIGUEZ MONEGAL, *a Uruguyan writer and journalist, is director of "Mundo Nuevo" (New World) a Spanish language literary review published in Paris. He was formerly professor of literature at the University of Montevideo.*

(1) Era un aire suave, de pausados giros:
el Hada Armonía ritmaba sus vuelos,
e iban frases vagas y tenues suspiros
entre los sollozos de los violoncelos.

The birth of a new idiom: the haunting music of the soul

convert the speech of a scattered tribe into an individual poetic utterance.

His second feat was equal to the first: he succeeded in imbuing other, younger poets with the new spirit; his genius embodied it in a language common to a whole rising generation. It was shaped in Santiago de Chile, spread to Buenos Aires, and triumphed in Madrid. Darío returned to the fountain-head (like a modern conquistador whose caravels were to reverse the course of history); he came to Spain to restore to its poetry and language the life, force and grace which they lacked.

The younger Spanish poets were the first to acknowledge the master, and joyfully harnessed themselves to his triumphal chariot. Antonio Machado, Juan Ramón Jiménez, Ramón del Valle Inclán, adopted this Latin American as their guide and paid homage to him in their verses. Before Darío came on the scene, these young poets were gagged by the prevailing mediocrity. Then Darío sauntered in smiling, to open new vistas, lighten the prose, electrify the verse.

What Darío, the "Indian", brought to Spain was not the gallic idiom, as the older critics complained, but the modern idiom: a new idiom of his own invention, and yet as old as the language spoken in Spain at the conquest of the New World; the speech he learnt as a child in Nicaragua, sharing the same roots with all its sister languages; the Spanish American tongue.

Darío came home like the prodigal son, with no riches but his words. He thus returned to the source, and brought the mother country the language preserved in America by the sons of the conquistadors. The treasures displayed by this "Indian" were intangible, yet they were a precious cargo: each word was new, and yet immeasurably old.

Those who still accused him of triviality did not look below the iridescent surface of his verse. In truth; Darío is much more earnest than he seems, and the poet's fundamental gravity underlies many of his poems about flirtatious Marquises and sorrowful princesses. He loved to juggle with lines, rhythms and rhymes, but behind the façade lay a passionate, tragic soul.

His passionate side was obvious and easy to copy. His gallant exploits went the round of the literati; they all knew of his escapades, his marriages, his many muses of flesh and blood. And there was much talk of his artificial paradises. The legends were no doubt exaggerated, but the poet's fame was not solely compounded of truth; falsehood also played its part.

In reality, Darío was no Don Juan: he was a headstrong, vulnerable man, who could be possessed or even swept away by love. Any number of his poems, singing of the joy and sorrow of love, are familiar to all admirers of poetry. He once confessed:

Like an unbridled colt my instincts
[galloped;
My youth rode an unbridled colt;
Intoxicated, with a dagger at the
[waist;
If I did not come to grief, it was by
[God's good grace.

In my garden stood a beautiful
[statue;
It seemed of marble, but was of
[living flesh;
A youthful soul within,
Sentimental, sensitive, sensuous (2).

For many years, readers and critics closed their eyes to any image of Darío but that of the victor, spending his life in the pursuit of pleasure and the capture of applause. But another, very different image lay behind. Masked by the harmony of this verses is a poet who suffers and is dying by inches. One of his most haunting poems brings us face to face with the reality: it shows him clinging to life, passionately hugging it, while Death inexorably draws near. The poem is *Lo fatal* (The Inevitable).

Happy the tree almost bereft of
[feeling;
Happier still the rock, impenetrable,
[insensitive;
No greater pain than that of being
[alive;
No greater sorrow than to live and
[feel.

To exist and to know nothing, to
[have no set course;
To tremble at the thought of life's
[quick ebb,
And the terrifying certainty of death
[tomorrow;
To suffer for life and for the
[shadow.

For the unknown or the dimly
[conjectured;
To feel the temptations of the
[flesh, sweet and tendril-like,
And the cold tomb crowned with
[funeral wreaths,
And not to know where we are
[bound, nor whence we came...! (3)

His biographers explain that at that time, Darío was disintegrating physicaly, drinking himself to death, dissolving into nothingness, a process sublimated into pure poetry. Darío had discovered that the flesh is stubborn and does not want to die, and that the infinite patience of Death is a pure fiction. Death consumes us implacably day by day; Death shapes and overshadows our lives. And in his verses—even the best, the most mournfully melodious—he is tracing the progress of Death's invasion and victory.

Thus, Darío's third great feat was to attain this profound insight for the Spanish and American verse of his time. Like every authentic creator, Darío was constantly at odds with his time. The conflict had its vicissitudes, periods of peace and even sudden gleams of cheerful harmony; but every victory in the long struggle compromised his closest links with his environment.

At one time, the Spanish language seemed threatened by his gallicisms and thirst for modernity. At other times, bourgeois conventions were endangered by the white-hot passion of his poetry. He sometimes offended the most sensitive political susceptibilities, which can influence the destiny of a whole continent.

For that reason he lived much of his life as a fugitive. Although firmly rooted in the land and language of his childhood, although he had covered the whole of Latin America in his triumphal progress, Darío lived a large part of his life in exile in Paris, and became a cosmopolitan. Only thus could he become still more deeply, more tragically Spanish American.

Up to the very end of his life he took no respite, but went on seeking and fighting. Death, which finally vanquished him one day in 1916, did not have an easy victory. The poet refused to yield an inch without a struggle, a cry, a lament. Long after his death, his poetry (and the poet's aspirations) live on.

---

(2) Potro sin freno se lanzó mi instinto,
mi juventud montó potro sin freno;
iba embriagada y con puñal al cinto.
si no cayó, fue porque Dios es bueno.
En mi jardín se vio una estatua bella;
se juzgó mármol y era carne viva;
una alma joven habitaba en ella,
sentimental, sensible y sensitiva.

(3) Dichoso el árbol que es apenas sensitivo,
y más la piedra dura, porque ésta ya no [siente
pues no hay dolor más grande que el [dolor de ser vivo,
ni mayor pesadumbre que la vida cons- [ciente.
Ser, y no saber nada, y ser sin rumbo [cierto,
y el temor de haber sido y un futuro [terror...
y el espanto seguro de estar mañana [muerto,
y sufrir por la vida, y por la sombra y [por
lo que no conocemos y apenas sospe- [chamos,
y la carne que tienta con sus frescos [racimos
y la tumba que aguarda con sus fúnebres [ramos,
y no saber adónde vamos,
ni de dónde venimos...!

GREAT MEN GREAT EVENTS

Photo © Keystone

Michael Faraday

THE distinguished British scientist Sir Humphrey Davy was once asked what he considered his greatest discovery. "Michael Faraday," was his answer. The son of a blacksmith, Faraday (1791-1867) had little formal education, but as a bookbinder's apprentice, he became fascinated by the scientific treatises in the books he bound. He devoured this knowledge, attended scientific lectures and at the age of 22, was engaged as laboratory assistant to Sir Humphrey Davy at the Royal Institution in London. Thereafter, he was to perform experiments which yielded some of the most significant inventions and principles in scientific history. He built the first rotary electric motor (1821), the first transformer and the first dynamo (both in 1831). Every generator, every electric motor and transformer, every one of the innumérable pieces of electric equipment all over the world operates today because of Faraday's work in electromagnetism. Faraday also made notable contributions to chemistry, including the liquifying of gases by use of pressure and the discovery of benzine. His laws of electrolysis linked chemistry and electricity and paved the way for today's electro-plating industry. Faraday's outstanding achievement was the discovery of electromagnetic induction: that moving a magnet rapidly near a coil of wire produces an electric current. A lady who saw his perform the experiment asked, "But, Professor Faraday, even if the effect you explained is obtained, what is the use of it?" "Madam", replied Faraday, "will you tell me the use of a new-born child?"

Johann Bernoulli

BORN in 1667, Johann Bernoulli, the distinguished Swiss mathematician, came from a family which left Antwerp to escape religious persecution and settled in Basle. Over the next two centuries, the family produced so many scientists that encyclopedias today distinguish them by putting a number beside their christian names, as in the case of kings. The name of Johann Bernoulli, however, stands out above the rest. As a young man he held a minor post in commerce and then studied mathematics and medicine. In 1694 he was awarded his doctorate at the University of Basle and the following year became a professor at the University of Groningen. His next post was at the University of Basle where he succeeded his brother Jacob (a mathematician celebrated for his work on the differential and integral calculus). A friend of Leibnitz, Johann Bernoulli discovered the exponential calculus and was the first scientist to determine the line of swiftest descent followed by a body. Before he died in 1748, Johann Bernoulli trained a number of young men who were also to become eminent in science—his sons Nicholas I, Daniel and Johann II, and Leonard Euler. All four made important contributions to the development of mathematics and physics.

Jonathan Swift

Photo © Bibliothèque Nationale, Paris

JONATHAN Swift (1667-1745) was one of the greatest satirists of all time—and one of the most misunderstood. Many people, not seeing what lies behind the savage irony of his work, have represented him as harsh and misanthropic. Yet the venom of Swift's pen contrasts sharply with the humanity and charity he showed to friends, relatives and the poor. He left all his modest fortune to build and endow a hospital for lunatics, idiots and, as he put it, "those they call incurable." Even his greatest work, "Gulliver's Travels," intended as a ferocious indictment of human nature, delighted the world instead of shocking it. The strange lands visited by Gulliver had much in common with the countries Swift knew. The tiny Lilliputians had the vices and weaknesses of ordinary men. In the island of Laputa, where "wise" men were engaged on fantastic projects, Swift parodied some of the scientists and philosophers of his own day. Born in Dublin of English parents, Swift was educated in Ireland where he entered the church in 1695. The country vicar gradually became well known through the writing of minor political tracts, but the publication of "Tale of a Tub" made him famous overnight. This satire on humanity in general and the church in particular, and "The Battle of the Books," a parody of literary controversy (both published in 1704) are still read for their comic commentary on human stupidity. With the "Drapier's Letters" (1724). Swift foiled the British Government in its attempts to impose a debased currency on Ireland, and five years later he published perhaps his most terrible satiric pamphlet, "A Modest Proposal"—that the people of Ireland eat their children as the only way to keep England from starving them to death. Swift continued to defend Ireland's cause and for the rest of his life he was the idol of the Irish people.

CONTINUED ON NEXT PAGE

José Enrique Rodo

AMONG the score of brilliant literary figures flourishing in Uruguay at the turn of the century, the one who best embodies the hopes and ideals of the times is the essayist and philosopher Jose Henrique Rodó (1872-1917). A mostly self-taught scholar, Rodó managed to reflect his vast culture and love of beauty in a prose of extraordinary flexibility and elegance, ill reflected in most of the translations of his works. Rubén Dario, whose genius Rodó was one of the first to recognize, was to say of him: "José Enrique Rodó is the Spanish-American thinker of our times. . . I would say that he is a sort of Latin Emerson, with a serenity originating in Greece." For all his love of ancient Greece, Rodó had the French philosopher Fenan for an ideological model. His own life oddly resembles that of his master. But in a literary magazine of which he was a co-founder in 1895, he became from the start a penetrating critic of the new Spanish writing. He analyzed and praised the work of the young Spanish-American poets. "Ariel," a call to a new idealism published in 1900, when the clouds of social change and revolution were already gathering in the European skies, was a lesson on democracy addressed to the Spanish-American youth; it is interesting to note it has lately had quite a revival. The beginning of the century was a time of social reforms, the heyday of the liberalism and the moderation of which Rodó became a champion. A plea for the protection of child labour made a sensation in 1903, when he wrote a study on working conditions in Uruguay. In 1909, Rodó published his masterpiece, "Motives of Proteus": meditations, parables, aphorisms and maxims whose central theme is the lifelong evolution of man and his need to direct it through self-knowledge.

Nicolai Lobachevsky

Photo © APN

FOR centuries the world's basic textbook on geometry was the "Elements" of the Greek mathematician Euclid written about 320 B.C. For nearly 2,000 years no one presumed to question Euclid's famous postulate that only one line parallel to a given line can be drawn through a fixed point. The man who challenged this by advancing his own "scandalous" postulate—that there are two parallels to the given line through any fixed point—was the Russian mathematician Nikolai Lobachevsky (1792-1856), who founded the new school of "hyperbolic" or "non Euclidean" geometry. Lobachevsky's entire academic life was linked with the University of Kazan (a city on the Volga, and today capital of the Tatar Republic) where he was a student, then a teacher and finally rector. His searching mind was to question not only long-accepted scientific beliefs but also, and as a result, some of the foundations of the philosophy of idealism which affirmed the a priori character of Euclidean ideas, without foreseeing that this could ever be contradicted. Lobachevsky announced his first studies on the new system of geometry in 1826 (when he was 34) and completed it in 1855. Conceived and developed independently, it agreed with conclusions reached by the German mathematician Frederic Gauss and by the Hungarian Janos Bolyai. The name of Lobachevsky thus remains inseparably associated with non-Euclidean geometry and with a striking revolution in human thought.

Georg Philipp Telemann

Photo Presse- und Informationsamt, Bonn

SIX thousand works, including 44 Passions, 100 oratorios, 40 operas and 12 cycles of cantatas, each of 52 works composed the voluminous musical heritage left by Georg Philipp Telemann, a gifted musician and the most prolific composer of 18th century Germany. Born in Magdeburg in 1681, he composed his first opera at the age of 12, an accomplishment that displeased his parents who planned to make a lawyer of this born musician. Aged 27 and already famous, he was appointed as *Kapellmeister* at Eisenach where he met Johann Sebastian Bach, became his friend and was later godfather to Bach's son, Karl Philipp Emanuel. When Telemann died in 1767 at the age of 86, his godson succeeded him as director of church music in Hamburg. At that time Telemann's music was admired in every part of Europe. But his works were soon forgotten and some fifty years later Franz Schubert condemned the world's neglect of a composer who he considered as "a master among the masters". Today Telemann is acknowledged as an innovator who was able to infuse into the new classicism all the grace and vigour of Baroque music.

Petr Bezruc

Photo Arnost Pustka, Prague

IN his homeland, Czechoslovakia, Petr Bezruc is one of the best known and appreciated of poets, and some of his poems have been translated into many languages. The poet's real name was Vladimir Vasek. Petr Bezruc was the pseudonym under which he wrote verses extolling the Czech struggle for national rights and denouncing the social, economic and ethnic oppression of his people by the Austro-Hungarian empire. Petr Bezruc was born in Opava, Silesia, in 1867. His father, Antonin Vasek, a schoolmaster and journalist, was one of the Czech nationalists whose struggle against Habsburg domination grew sharper towards the end of the 19th century. Petr Bezruc's first verses were published in 1899 and many of his poems were later collected in book form as "Silesian Songs" (a selection translated into English was published by Artia, Prague, in 1966). He was not a professional poet in the sense of having literary aspirations. As he once put it: "Year after year, the immense oppression weighed upon me... so I wrote down these few poems to give voice to that oppression. If they have had effect it is only the truth of rattling chains."

Vicente Blasco Ibanez

Photo © Antonio Galvez

VICENTE Blasco Ibañez, born in Valencia, Spain, in 1867, started writing at the age of 12. At 14, he was already completing, in Madrid, the works of a novelist who had engaged him as his secretary. His youth was marked by incessant pamphleteering and political protest, which forced him twice to flee Spain and took him to jail about 30 times. He also was elected six times to the Spanish Cortes. In 1909, tired of politics, he went to Argentina, whose scene was to inspire three of his most famous novels. One of them, "The Four Horsemen of the Apocalypse," published in 1914 more as an anticipation than an actual comment on the world conflict, was the first international success among modern war novels, opening to him the doors of the American literary market and Hollywood fame. Blasco Ibañez died a millionaire. He wrote no less than 30 novels which reveal his talent for creating characters and his gift for conducting narrative action.

Charles Baudelaire

Photo © Bibliothèque Nationale, Paris

THE "case" of Baudelaire is unique in the history of literature already rich in examples of misunderstanding and dramatic reversals of opinion. Charles Baudelaire, one of the greatest names in French poetry, gained the recognition refused him in his lifetime long after his death in 1867. Born in 1821, he began to write at an early age. Among the poems in *Les Fleurs du Mal* (The Flowers of Evil), a collection published in 1857, are some he wrote in 1842 and 1843. The book caused a scandal and Baudelaire was prosecuted for offending against public morals. Although such literary giants as Victor Hugo and Théophile Gautier recognized in Baudelaire a writer of startling originality, the poet's works were scorned by the critics in vogue and he was wantonly vilified. It was perhaps less his private life (somewhat wild and unrestrained for his day) than the profound distress that imbued his poems and his discovery of "modernity" (a word he coined) which earned him the suspicion and hatred of contemporary society. That society had no wish to question any of the established social or literary norms nor to consider the possibility of the metamorphosis of such values. Baudelaire created a new poetical art that was to make its impact on French literature and prepare the way for Rimbaud and Mallarmé. A brilliant critic he drew attention to new aesthetic values in many fields. In literature, for example, he revealed to his countrymen the works of Edgar Allan Poe, in French versions that are masterpieces of the translator's art. In music he analyzed the revolutionary innovations of Richard Wagner. In painting, his studies on Eugène Delacroix, Constantine Guys, Daumier and Edouard Manet brought out the meaning of the new tones and forms in colour and drawing. Baudelaire's personal journals speak of his prolonged sufferings and his solitude from which a serious illness delivered him in 1867.

Luigi Pirandello

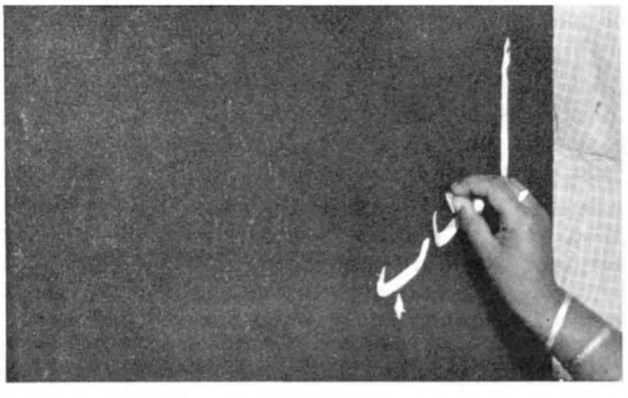
Photo © Publifoto, Rome

FOR nearly half a century, the name of Luigi Pirandello dominated Italian Letters. When Pirandello was awarded the Nobel Prize for Literature in 1934, two years before his death, he had become a world-famous dramatist who had given the theatre a new psychological dimension. Born in 1867 at Agrigente in Sicily, he first taught Italian literature in Rome and began publishing short stories and novels in 1893. Many of these deal with the lower middle class milieu or the farming communities in Sicily. Though Pirandello wrote some 300 stories and six novels, his work as a novelist has been somewhat obscured by his fame as a playwright, though he used the same themes in both media. Novels such as "The Late Mattia Pascal" (1904) reveal the same irony, the same compassion that inspired the author to create the contradictory and vacillating characters found in many of his plays. Pirandello's main themes are the necessity and vanity of illusion, the multiform appearances, all of them unreal, of what is presumed to be the truth; man is not what he thinks he is, but he is "one, no one and a hundred thousand" (the title of a Pirandello novel) according as he appears to different persons, and is always different from what he creates himself in his own mind. Pirandello's plays have been translated into many languages, and have taken their places among the masterpieces of the modern theatre.

60th anniversary of the use of Arabic in Egyptian schools

ARABIC is today a language fully adapted to the needs of the 20th century with an abundant vocabulary of technological and scientific terms which, as it continues to expand, constantly adds new, expressive terms to the language of the Koran. Scientific works, technical manuals, books and reviews on science are written in Arabic or translated into it. The up-to-date vocabulary of the spoken word, with its mobility, inventiveness and imagery is being grafted on to the traditional written language, bringing with it the new ideas of the atomic age and the era of space exploration. The swift renovation of Arabic is all the more remarkable in view of the decline it suffered for four centuries following the invasion of Egypt by the Turks in 1517. Until the beginning of the 19th century Turkish replaced Arabic which thus was in danger of becoming a dead language. Since the first Arabic language university was created in Egypt sixty years ago and the use of Arabic was established for schools, the press and government services, the language has recovered its vigour and powers of adaptability. The Unesco General Conference in 1966 decided to add Arabic to English, French, Spanish and Russian as a working language of Unesco.

Photo Unesco-G. Bohm



THE WORLD FOOD PROGRAMME

A new form of aid for development

by Colin Mackenzie

MODERN international aid, in the years since the discovery that wealth can be shared without too much risk, with honour and indeed with profit, has come to assume varied forms.

Cash of course predominates for, as Schopenhauer once remarked, money is the one thing which is not only a concrete satisfaction of one need in particular, but an abstract satisfaction of all. In addition, however, there is a wide variety of material and equipment. There is also technical advice —experts of one kind and another spread around the developing countries armed with anything from syringes to theodolites. And now, as a relatively new form of aid, there is food.

Relatively new? After all, as long ago as the third century B.C., Hieron II, Tyrant of Syracuse, sent grain to Egypt in time of famine. Yes, but food aid today is something rather different. It is not merely concerned with the feeding of hungry people, for, in the context of the looming world food crisis, such a course would be not only completely insignificant in relation to the size of the problem but also totally irrelevant to the need for curing the basic economic malaise which has caused it. Food aid, like other forms of modern aid, is intended to produce something more tangible and materially lasting than the prospect of a descent of blessings on the givers.

To get an idea of food in action as a stimulus to a country's economic and social development, one needs to look at some of the projects that the World Food Programme (WFP) is aiding.

In the north of Morocco, some 30,000 children are being fed in primary and secondary schools in several areas, with the result that enrolment is up by 15 to 20 per cent. This means that one day there may be just that many more doctors or administrators or engineers in Morocco than there would otherwise have been.

In 1964, the Programme invested some $300,000 to help in the reclamation of land in the Republic of China. The food was distributed for two years to settlers while they went about preparing the land and sowing their crops. Now, 2,500 hectares (6,200 acres) of wasteland have been transformed into prosperous farms whose annual production will be worth five times the original investment of food.

In Columbia, inhabitants of some of the poorer city suburbs have worked after hours paving their own streets. Their incentive—and to some extent their compensation—was the food supplied by the Programme.

In one village in Senegal, one ton of couscous made from WFP sorghum was used to mobilize enough people to clear and plant enough land to produce 45 tons of rice.

These are a few small instances taken at random from the 230-odd projects that have been approved since the Programme started operations at the beginning of 1963. The range of development activities it has aided is very wide.

There have been projects for feeding, not only school-children and students, but also expectant and nursing mothers and children still too young to go to school—all this investment in countries' future resources in human skills.

The Programme has helped to resettle Bedouins in the Middle East, refugees in Africa and communities threatened with inundation after the building of the Aswan Dam. With the food it has supplied, previously unemployed (or underemployed) rural workers have set to work planting new or more abundant forests, particularly in sorely eroded areas around the Mediterranean where there are the ravages of 2,000 or 3,000 years to be repaired. It provides animal feed to help fatten and multiply a country's livestock.

There is a $10,000,000 project to improve milk supplies in India. Roads have been built—in one instance, in an island off Korea, linking up 95 isolated villages. There are projects in Turkey to help feed workers in some industries and mines and thus boost productivity. WFP food has been used as part payment of the wages of workers repairing the famous Hedjaz Railway that runs from Damascus to Medina and was originally built largely to carry Moslem pilgrims.

A point to be remembered about the Programme's assistance to countries in their pursuit of economic and social development is that it is only assistance. It has been found that, on average, something like 80 per cent of the costs of projects is borne by the countries themselves. WFP aid is often primarily a stimulus, the extra incentive that makes the difference between whether a project is started or not.

It was said earlier that merely feeding the hungry is not enough. But there are of course times of dire emergency when not feeding the hungry would also be less than enough. That is why the Programme, with the stocks of food it has at its disposal, also comes to the aid of victims of emergencies, whether these are sudden, unforeseeable catastrophes like hurricanes, typhoons, earthquakes and volcanic eruptions or the slowly punishing ravages of a long drought.

Emergency operations, however, are

Photo © H. W. Silvester

not the primary aim of the Programme, and so far never more than about a quarter of its resources have been allocated to them in any one year. The success of the operations has varied inversely with the size of the emergency and the number of victims. In Botswana, where there was a prolonged drought, food supplies at a total cost of less than $5.5 million helped to keep the entire country going for several months when things were at their worst. On the other hand, more than $13.5 million spent in the last year or so on sending food to the drought-stricken areas of India, including the states of Bihar and Uttar Pradesh, has had little impact on so wide a sweep of suffering.

The fact is that the resources of the World Food Programme, as yet, are totally inadequate for meeting any kind of famine on the scale that now seems to threaten.

What are these resources? And, indeed, how did the World Food Programme come into being at all?

The story probably goes back to the 1930s, when for the first time people were struck by the disquieting phenomenon of a glut of huge, wasteful agricultural surpluses in some countries (notably the United States, although in Brazil too, for example, 75 million bags of coffee had to be burned during the period) while masses of people in other areas of the world went hungry. It was the pressure to find an outlet for surpluses that originally prompted the idea of food aid.

From the end of the Second World War, the U.N. Food and Agriculture Organization (FAO) worked hard on the problem of surplus disposal, but the most important large-scale initiative for putting food aid into practice was taken by the United States in 1954 with the passage of an Act—usually known as Public Law 480—as a result of which $13,000 million worth of surplus agricultural commodities were shipped to other countries in the decade that followed.

By this time, however, the idea of development aid on the multilateral pattern was gaining ground, especially following the heavy influx of newly-independent nations into the councils of the United Nations and its Specialized Agencies.

So the two trends—a constructive method of surplus disposal and the new emphasis on multilateral aid—merged. At the end of 1961, following studies carried out by FAO at the United Nations' request, parallel resolutions in the two organizations set up the World Food Programme on an experimental three-year basis with a target of $100 million in commodities and cash. Thus the Programme, which formally started operations on January 1, 1963, is the child of both the United Nations, with its general concern for economic and social development, and FAO, with its special competence in matters connected with food.

By the end of 1965 when the experimental period was drawing to a close, the Programme had sufficiently proved itself for the United Nations and FAO to decide to continue it "for as long as multilateral food aid is found feasible and desirable." Despite the fact that by its nature the Programme is meant to be only a preliminary to plenitude, this looks like being for some while yet.

The Programme lives by pledges of commodities and cash from its participating countries—participation is

U. N. Photo

Tuna fishermen off the coast of Ceylon.

THE WORLD FOOD PROGRAMME *(Continued)*

open to all Members of the United Nations or FAO. The proportion is two-thirds in commodities—food and animal feed, with cereals heavily predominating—and one-third in cash or services such as shipping. During the 1963-5 experimental period, the target of $100 million was very nearly fully subscribed. For the new three-year pledging period 1966-8, a much higher target was set—$275 million. This time the response in pledges has been proportionately much lower—the resources at present available to the Programme are worth less than $60 million a year, a figure which should be set against the annual $1,500 million to $2,000 million which represents the totality of food aid in recent years.

In comparing these figures, it should once again be remembered that there is a growing preference for multilateral aid—not only among the developing countries which would thereby have a greater say in events, but also, in the case of food aid, among some of the major donors which would like to see the burden more evenly shared. It may thus be that the Programme will be allotted a really sizeable part of the extra 4.5 million tons of food aid that was agreed on in the closing days —or nights—of the Kennedy Round negotiations, and also that future pledging targets—and, even more pertinently, the pledges themselves—will in the 1970s go sufficiently beyond the $200 million now proposed for the two-year period 1969-70 to enable the Programme to measure up more adequately for its part to the trials awaiting the international community.

The curious might still inquire how the Programme actually handles the food it already has. The answer is simple in general terms, but extremely complicated in practice. Everything must begin with a country's request for aid which, in the case of development projects, is submitted to a formidable process of scrutiny by the Executive Director and his staff in Rome and by whichever of the co-operating international organizations is concerned—Unesco in the case, for example, of a school-feeding project. The preliminaries for emergency operations—which have to be authorized by the FAO Director-General—are naturally much more summary.

Among the most strenuous complications are those of earmarking and allocating the variety of foodstuffs from the large number of countries which have pledged them to the variety of projects or emergency operations needing them—and in the quantities and units in which they are needed. At the end of 1966, about 40 countries had pledged food and WFP was operating in about 50. In addition, unless a donor country provides its own shipping, the Programme has to organize transport of the goods, including insurance, to the recipient country. The World Food Programme is very much a business operation.

So, from what was originally the problem of how to make the best use of unwanted agricultural surpluses has grown a new form of aid for development in the long-term interests of all. The need is great, but so are the potentialities. It is worth recalling what John F. Kennedy once said, even before he became U.S. President, addressing a farm audience at Mitchell, South Dakota, in the late fifties. "I don't regard the ... agricultural surplus as a problem," he declared. "I regard it as an opportunity." For, he affirmed, "... food is strength, and food is peace, and food is freedom, and food is a helping hand to people around the world ..."

From the Unesco Newsroom...

World's first 'International Literacy Day' and the Reza Pahlavi Literacy Prize

The world's first 'International Literacy Day', was celebrated on September 8 in all Unesco's member states. On this occasion, Mr René Maheu, speaking at Expo 67 in Montreal, and U Thant, Secretary-General of the United Nations, called for an international effort in support of the global fight against illiteracy. On September 7, Mr Maheu presided at the presentation of the first Mohammed Reza Pahlavi Literacy Prize, during a ceremony held at Unesco H.Q. in Paris. The $5,000 prize, contributed by His Imperial Majesty the Shahinshah of Iran, was awarded to students of the Girls Secondary School at Tabora, Tanzania, who as volunteer teachers visited homes and community centres to give literacy teaching to more than 400 people. Their example has encouraged students in other Tanzanian secondary schools to start adult literacy classes. Since 1964 Tanzania has developed literacy programmes as part of its national development plan. By January 1965, 7,257 classes were operating, attended by over 540,000 adults, of whom about two-thirds were women.

Visitor from outer space

A meteorite—in two main pieces, one weighing 12 tons and the other about 3—found in a remote part of Western Australia, is Australia's largest meteorite and the eleventh largest found in the world. Geophysicists believe this visitor from outer space is 93 per cent iron and nearly 7 per cent nickel, that it crashed to earth tens of thousands of years ago and probably came from an asteroid belt between the planets Jupiter and Mars.

140,000 U.S.-international educational exchanges

Over 140,000 persons—college and university students, teachers and scholars—were involved in educational exchange between the U.S. and 172 other countries and territories in 1966-67, according to "Open Doors" 1967, the annual survey of educational exchange statistics published by the Institute of International Education, New York. This record figure included a total of 100,262 students from abroad enrolled in 1,797 U.S. institutions of higher learning, which also were hosts to more than 10,700 professors, scholars and researchers from a record 118 countries.

Associated schools and the Marie Curie centenary

To mark the centenary of the birth of Marie Curie, Polish schools which are members of the Unesco Associated Schools project have prepared materials on her life and work for the schools abroad that they correspond with. A suggestion by the Polish National Commission for Unesco has led to the "twinning" of the Marie Sklodowska-Curie School in Lublin with the Lycée Marie Curie at Sceaux, near Paris.

A U.S. Directory of Correspondence Courses

Determining the quality of correspondence courses before enrolling is usually difficult. Private correspondence schools in the U.S.A. which meet certain high standards are accredited by the National Home Study Council which is recognized by the U.S. Office of Education as an accrediting agency. Anyone can obtain a free copy of a "Directory" which lists accredited schools and courses they offer by writing to the National Home Study Council, 1601 18th Street, N.W., Washington D.C. 20009, U.S.A.

New Soviet vessels for 'World Weather Watch'

The Soviet Union is building about ten new research ships some of which will supply vital data for the World Weather Watch programme during its first phase 1968-71. The programme calls for at least seven new weather ship stations to fill "gaps" in the southern hemisphere. The Soviet ships are expected also to undertake important work in oceanography, communications data, processing, forecasting and, especially, storm warnings. As ocean areas cover 70 per cent of the surface of the globe and are poorly served by meteorological stations, the weather watch programme will also make more use of merchant shipping for obtaining observations.

Saving grain by nuclear radiation

The world's first plant for saving grain by using nuclear radiation to kill insect pests is installed at Iskenderun, Turkey. Grain from large hoppers falls past a powerful source of radioactive cobalt whose gamma radiation sterilizes the insects in the grain. A degree of protection is thus given against reinfestation by the same species. World grain losses through insects total some 5 per cent of all grain produced; the amount lost each year could feed 100 million people.

Floating laboratory for ocean research

A new ocean research vessel, the "Oceanographer" has been launched in the U.S.A. Designed to stay at sea for five months at a time, the ship has over 4,000 square feet of laboratory space, and a computer capable of 10,000 operations a second. The computer will be used to sort, analyze and store data on temperatures, sediments, currents and other maritime phenomena.

BOOKSHELF

UNESCO'S TRANSLATION SERIES

Japan

■ **Japan's First Modern Novel: "Ukigumo" of Futabatei Shimei**

Translation and critical commentary by Marleigh Grayer Ryan. Columbia University Press, New York and London, 1967 ($10.00).

Pakistan

■ **Tree Without Roots**

By Syed Waliullah
A novel from the Bengali, translated by Qaisar Saeed, Anne Marie-Thibaud and Malik Khayyam. Chatto and Windus, London, 1967 (21/-).

China

■ **Fifty Songs from the Yüan (Poetry of 13th Century China)**

Translated and with an introduction by Richard F.S. Yang and Charles R. Metzger. George Allen and Unwin Ltd, London, 1967 (35/-).

In the U.S., the Unesco Publications Center, 317, East 34th Street, New York, can supply all the above volumes.

Brazil

■ **La Vengeance de l'Arbre et Autres Contes**

By José Monteiro Lobato
A collection of stories originally entitled "Urupês".
Translated from the Portuguese into French by Georgette Tavares Bastos. Editions Universitaires, Paris, 1967 (18.50 F).

★

■ **Glossary of Linguistic Terminology**

By Mario Pei
An Anchor Original book, Doubleday and Company, Inc., New York, 1966 (paperback: $1.95).

■ **A Guide to Book-Publishing**

By Datus C. Smith, Jnr.
R.R. Bowker Co., New York, 1966 ($6.00).

■ **Miracles (Poems by children of the English-speaking world)**

Collected by Richard Lewis
Simon and Shuster, New York, 1966 ($4.95).

■ **Pakistan**

Edited by Ibnul Hasan with a foreward by Mumtaz Hasan, S. Pk.
United Advertisers, 12-A, Block-6 P.E.C.H.S., Karachi-29, (1967).

★

Readers are advised that the following books listed in our July 1967 Bookshelf—"Japanese Architecture", "Japanese Handicrafts" and "Japanese Gardens"—are no longer distributed by Charles E. Tuttle Company, Rutland, Vermont. They are now available in the U.S.A. through Japan Publications Trading Company, P.O. Box 7752, Rincon Annex, 1255 Howard Street, San Francisco, California 94119.

Letters to the Editor

LESSON FROM THE PAST

Sir,

I have been deeply shocked by the recent tragic conflict in the Middle East. It has shown once more that only an atmosphere of friendship and mutual understanding can bring the true peace and effective co-operation so urgently needed by both Jews and Arabs.

A utopian thought? It may seem so nowadays, but there were times, indeed centuries, when peaceful co-existence and cultural exchanges existed between these peoples and brought fruitful results—in Medieval Spain for example. One need only recall the achievements of such great thinkers as Maimonides, the Jewish rabbi, savant, physician and philosopher and his contemporary, Averroes, the Arab scholar, lawyer and philosopher.

By publishing a number of the "Unesco Courier" devoted to the cultural and scientific aspects of Arab-Jewish co-operation in the past, Unesco could make an important contribution to the cause of peace in the Middle East.

Carlo Rosso
Madrid, Spain

NEW LIGHT ON POPULATION PROBLEMS

Sir,

The presentation of the population problems facing our children and grandchildren ("Unesco Courier", February 1967) was fascinating. However, your distinguished contributors—and in this they follow most contemporary scientific writers—may have accepted too easily the current projections of the orthodox demographers. In the face of such overpowering figures, has objective, and especially external judgment of these parameters been suspended just a bit? The line of man's fate seldom turns out to be the shortest distance between two points, and it seems time that related disciplines brought their gains to bear more closely on the demographers.

In the last few years developments, even revolutions, in accepted concepts in anthropology, zoology, physiology and in particular endocrinology, and psychosomatic and psychological medicine have produced potentially enormous contributions, which have not been fully integrated in the main demographic stream. There is a wealth of deductions to be harvested for instance from the work of Leakey, Keith, La Barre, Marais, Elliott, C.R. Carpenter, Wynne-Edwards, Bolk, J.J. Christian and A.D. Jonas, to name but a few. In some sections, popularization is abreast or even ahead of the academics—exemplified by Ardrey's "Territoria Imperative", which will mean much more to demography than has yet been expounded.

Insights from the disciplines mentioned can provide for instance the sort of links which Jean Fourastié is seeking in his passage on the "four quantities of space". A striking foretaste of the way in which, when a wider range of disciplines is called in aid, some of the present question-marks in studies of population, industrialization and urbanization, and medicine fall into place was provided in a paper read at the last annual meeting of the American Association for the Advancement of Science by the Swedish demographer, Olin, entitled: "Feedback mechanisms in human populations: a hypothesis about the self-regulation of population growth". This opens up the possibility of a more hopeful adjustment of projections, which the press in North America was quick to seize upon.

The rapid mobilization of interdisciplinary influences on contemporary demography will be a vastly intricate and highly intellectual task, which Unesco should be particularly well fitted to foster.

G. E. Yates
Valetta, Malta

'AFRICAN ARTS - ARTS D'AFRIQUE'

Sir,

Readers who enjoyed your excellent June 1967 issue devoted to "Africa and the African Genius", may be interested to know that in October, 1967, the African Studies Center of the University of California, is bringing out a new quarterly, *African Arts-Arts d'Afrique*.

This magazine, richly illustrated (including full-colour pages), will serve to record African traditional art and to encourage contemporary African artists in all fields of artistic endeavour, graphic, plastic, performing, and literary. Its mission also is to broaden the appreciation of the art of Africa, *in* and *beyond* Africa.

Congratulations on the continued excellence of the "Unesco Courier".

Paul O. Proehl, Director
African Studies Center
University of California
Los Angeles, U.S.A.

MAN AND HIS RELIGION

Sir,

In your April 1967 issue I especially loved the centre colour page (stained glass, Tournai Cathedral). That naughty prelate taking precious cash from the bread-seller is admirable.

On another subject: the EXPO 67 article is excellent but I wish you could have found space for a photograph of Canada's own pavilion. I find the architecture of this pavillon quite outstanding—of equal interest to that of "Habitat", for example. And the theme of the Canadian Pavilion gives the theme of the entire EXPO in miniature. Perhaps you could publish a separate article about this Pavilion in a later issue.

It is ironic that, among all the themes of EXPO, there is no mention of Man and his Religion. Perhaps, indeed, we modern prelates would have been unable ever to agree on the contents of such a Pavilion (yes, in spite of the World Council of Churches and Vatican II). But this omission points up an enormous "lacune" in EXPO 67; an enormous "lacune" also in the U.N., in Unesco—and in the world. However I am old enough and (maybe) wise enough to realize that I suggest the impossible ... but since "all things are possible with God", I daresay I don't care overmuch.

Please don't tell me that there *is* a Pavilion devoted to Religion at EXPO 67. I know this already, but it pays only lip-service to what I am trying to say.

The Rev. G. L. Carnes
Vicar-General of the Anglican Church in Haiti, Port-au-Prince

HIROSHIMA'S MONUMENT

Sir,

Reading your article on the statues of Rameses II at Abu Simbel being given a new home (February 1967) reminded me that we in Hiroshima also had a monument awaiting preservation—the ruins of the municipal buildings high above whose dome the first atomic bomb was exploded in 1945.

The campaign to maintain the ruins as a monument began in Hiroshima and became nationwide, but municipal funds for urgent preservation measures were insufficient. More money was raised and the task is in hand.

It is not our intention to commemorate hatred or revenge against America. We aim to end war for all time by instilling the desire for peace in the minds of all who will come to see the dome. We support the Constitution of Unesco.

Sakuichiro Kanai
Saitama Ken, Japan

WELCOME TO MILLTOWN

Sir,

The Milltown Unesco Group would like to hear from young people in any part of the world who choose to come to Ireland any time this year or next. With the co-operation of local organizations it would be possible to accomodate them in managable numbers from for one day to one month. That is our contribution to International Tourist Year.

Michael O Sullivan
Group Leader,
Knockavota, Milltown
Co. Kerry, Republic of Ireland

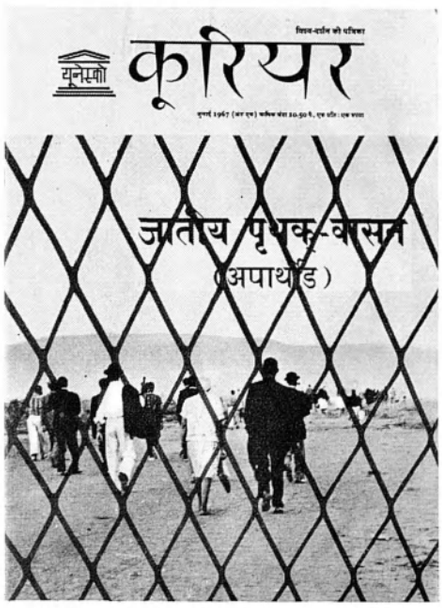
Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE.

THE UNESCO COURIER in Hindi and Tamil

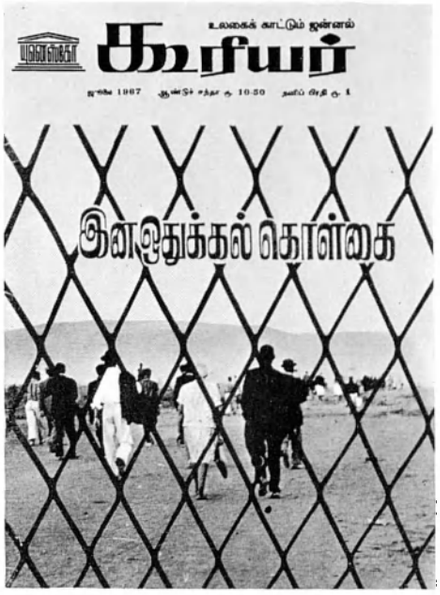
We are pleased to announce the launching of two new language editions of the UNESCO COURIER.

Publication began in India, in July 1967, of a Hindi edition in Delhi and of a Tamil edition in Madras.

This brings to eleven the number of editions of the UNESCO COURIER. The Unesco Courier is happy to welcome this new international family of readers which it hopes will give fresh impetus to the efforts to promote international understanding it has deployed since it began publication 20 years ago.



HINDI



TAMIL

WHERE TO RENEW YOUR SUBSCRIPTION

and order other Unesco publications

Order from any bookseller, or write direct to the National Distributor in your country. (See list below; names of distributors in countries not listed will be supplied on request.) Payment is made in the national currency; the rates quoted are for an annual subscription to THE UNESCO COURIER in any one language.

★

AFGHANISTAN. Panuzaï, Press Department, Royal Afghan Ministry of Education, Kabul. — **AUSTRALIA.** Longmans of Australia Pty Ltd., Railway Crescent, Croydon, Victoria; sub-agent United Nations Association of Australia, Victorian Division, 4th Floor, Askew House, 364 Lonsdale St., Melbourne C. I. (Victoria); for the Unesco Courier only : Dominie Pty Ltd, 463 Pittwater Road, Brookvale (N.S.W.) ($A 2.25). — **AUSTRIA.** Verlag Georg Fromme & C°., Spengergasse 39, Vienna V (Sch. 70.-). — **BELGIUM.** All publications: Editions "Labor", 342, rue Royale, Brussels. 3. NV Standaard-Wetenschappelijke Uitgeverij Belgiëlei 147, Antwerp. I. For The Unesco Courier (140 FB) and art slides (488 FB) only : Louis De Lannoy, 112, rue du Trône, Brussels 5. CCP 3380.00. — **CANADA.** Queen's Printer, Ottawa, Ont. ($ 3.00). — **CEYLON.** Lake House Bookshop, Sir Chittampalan Gardiner Mawata, P.O.B. 244, Colombo, 2 (Rs. 7). — **CHINA.** World Book Co. Ltd., 99 Chungking South Rd., Section 1, Taipeh, Taiwan (Formosa). — **CYPRUS.** "MAM", Archbishop Makarios 3rd Avenue, P.O. Box 1722, Nicosia. — **CZECHOSLOVAKIA.** S.N.T.L., Spalena 51, Prague 1 (permanent display); Zahranicni literatura Bilkova 4, Prague 1. — **DENMARK.** Ejnar Munksgaard, Ltd., Prags Boulevard 47, Copenhagen S. (D. Kr. 17). — **ETHIOPIA.** International Press Agency. P.O. Box 120, Addis Ababa (10/-). — **FINLAND.** Akateeminen Kirjakauppa, 2 Keskuskatu, Helsinki. (Fmk. 9.40). — **FRANCE.** Librairie de l'Unesco, Place de Fontenoy, Paris-7°. C.C.P. 12598-48. (10 F). — **GERMANY.** All publications: R. Oldenbourg Verlag, Rosenheimerstrasse 145, Munich, 8. For the Unesco Kurier (German ed only) Bahrenfelder-Chaussee 160, Hamburg-Bahrenfeld, C.C.P. 276650 (DM 10). — **GHANA** Methodist Book Depot Ltd., Atlantis House, Commercial Street, POB 100, Cape Coast. — **GREAT BRITAIN.** See United Kingdom. — **GREECE.** Librairie H. Kauffmann, 28, rue du Stade, Athens; Librairie Eleftheroudakis, Nikkis 4, Athens. — **HONG-KONG.** Swindon Book Co., 64, Nathan Road, Kowloon. — **HUNGARY.** Académiai Könyvesbolt, Váci u. 22, Budapest V; A.K.V. Könyvtárosok Boltja, Népközt ársaság utja 16, Budapest VI. — **ICELAND.** Snaebjörn Jonsson & Co., H.F., Hafnarstraeti 9, Reykjavik. (120 Kr.) — **INDIA.** Orient Longmans Ltd., Nicol Road, Ballard Estate, Bombay 1; 17 Chittaranjan Avenue, Calcutta 13; 36a, Mount Road, Madras 2; Kanson House, 1/24 Asaf Ali Road, P.O. Box 386, New Delhi. 1; Sub-Depots : Oxford Book & Stationery Co., 17 Park Street, Calcutta 16 and Scindia House, New Delhi : Indian National Commission for Cooperation with Unesco, Ministry of Education, New Delhi 3. (Rs. 10.50). — **INDONESIA.** P.T.N. "Permata-Nusantara" c/o Department of Commerce 22, Djalan Nusantara Djakarta — **IRAQ.** McKenzie's Bookshop, Al-Rashid Street, Baghdad; University Bookstore, University of Baghdad, P.O. Box 75, Baghdad — **IRELAND.** The National Press, 2, Wellington Road, Ballsbridge, Dublin. 4. (15/5). — **ISRAEL.** Emanuel Brown, formerly Blumstein's Bookstores, 35 Allenby Road and 48 Nahlat Benjamin Street, Tel-Aviv (1£8). — **JAMAICA.** Sangster's Book Room, 91 Harbour Street, Kingston. (15/-). **JAPAN.** Maruzen Co. Ltd., 6 Tori-Nichome, Nihonbashi, P.O. Box 605 Tokyo Central, Tokyo (1,200 yen). — **JORDAN.** Joseph I. Bahous & Co., Dar-ul-Kutub, Salt Road. P.O.B. 66, Amman. — **KENYA.** E.S.A. Bookshop, P.O. Box 30167, Nairobi (10/-). — **KOREA.** Korean National Commission for Unesco, P.O. Box Central 64, Seoul. — **KUWAIT.** The Kuwait Bookshop Co., Ltd., P. O. Box 2942, Kuwait — **LIBERIA.** Cole and Yancy Bookshops Ltd., P.O. Box 286. Monrovia (10/-). — **LUXEMBURG.** Librairie Paul Bruck, 22, Grand-Rue, Luxemburg (F.L. 140). — **MALAYSIA.** Federal Publications Ltd., Times House, River Valley Road, Singapore, 9; Pudu Building (3rd floor), 110, Jalan Pudu, Kuala Lumpur (M. $ 7.50). — **MALTA.** Sapienza's Library, 26 Kingsway, Valletta, (15/-). — **MAURITIUS.** Nalanda Company Ltd., 30, Bourbon Street, Port-Louis (15/-). — **MONACO.** British Library, 30, Bld. des Moulins, Monte-Carlo. (F. 10). — **NETHERLANDS.** N. V. Martinus Nijhoff, Lange Voorhout, 9, The Hague. (fl. 8.50). — **NETHERLANDS ANTILLES.** G. C. T. Van Dorp & Co. (Ned Ant.) N.V., Willemstad, Curaçao. N.A. (NA fl 4,50). — **NEW ZEALAND.** Government Printing Office, 20, Molesworth Street (Private Bag), Wellington; Government Bookshops: Auckland (P.O. Box 5344), Christchurch (P.O. Box 1721), Dunedin (P.O. Box 1104) (15/-). — **NIGERIA.** C.M.S. Bookshops, P.O. Box 174, Lagos (10/-). — **NORWAY.** All publications: A.S. Bokhjornet, Akersgt 41-Oslo 1. For Unesco Courier only: A.S. Norvesens Litteraturjeneste, Box 6125, Oslo 6, (17.50 kr.). — **PAKISTAN.** The West-Pak Publishing Co. Ltd., Unesco Publications House, P.O. Box 374 G.P.O., Lahore; Showrooms : Urdu Bazar, Lahore, and 57-58 Murree Highway, G/6-1, Islamabad. — **PHILIPPINES.** The Modern Book Co., Inc., 928 Rizal Avenue, P.O. Box 632, Manila — **POLAND.** All publications: ORWN PAN Palac Kultury, Warsaw. For the Unecco Courier only: "RUSH", ul. Wronia, 23, Warsaw 10 (zl. 60.). — **PORTUGAL.** Dias & Andrade Lda, Livraria Portugal, Rua do Carmo 70, Lisbon. — **PUERTO RICO.** Spanish English Publications, Eleanor Roosevelt 115. Apartado 1912, Hato Rey. — **SOUTHERN RHODESIA.** Textbook Sales (PVT) Ltd., 67, Union Avenue, Salisbury. — **SUDAN.** Al Bashir Bookshop, P. O. Box 1118, Khartoum. — **SWEDEN.** All publications : A/B C.E. Fritzes Kungl. Hovbokhandel, Fredsgatan 2, Stockholm 16. — For the Unesco Courier: The United, Nations Association of Sweden, Vasagatan 15-17, Stockholm, C (Kr. 12); **SWITZERLAND.** All publications : Europa Verlag, 5 Rämistrasse, Zurich. Payot, rue Grenus 6, 1211, Geneva 11, C.C.P. 1-236. "Courier" only: Georges Losmaz, 1, rue des Vieux-Grenadiers, Geneva. C.C.P. 1-4811. (Fr. S. 10). — **TANZANIA.** Dar-es-Salaam Bookshop, P.O.B. 9030 Dar-es-Salaam. — **THAILAND.** Suksapan Panit Mansion, 9, Rajdamnern Avenue. Bangkok. (35 ticals). — **TURKEY.** Librairie Hachette, 469 Istiklal Caddesi, Beyoglu, Istanbul. — **UGANDA.** Uganda Bookshop, P.O. Box 145, Kampala (10/-). — **SOUTH AFRICA.** All publications : Van Schaik's Bookstore (Pty) Ltd., Libri Building. Church Street, P.O. Box 724, Pretoria. For the Unesco Courier (single copies) only : Central News Agency P.O. Box 1033, Johannesburg. (R1.-50). — **UNITED ARAB REPUBLIC (EGYPT).** Librairie Kasr El Nil, 38, rue Kasr El Nil, Cairo. Sub/agent : La Renaissance d'Egypte, 9 Sh. Adly-Pasha, Cairo. — **UNITED KINGDOM.** H.M. Stationery Office, P.O. Box 569, London, S.E.I., and Government Bookshops in London, Edinburgh, Cardiff, Belfast, Manchester. Birmingham and Bristol. (15/-). — **UNITED STATES.** Unesco Publications Center, 317 East 34th St, New York, N.Y. 10016 ($ 5.00). — **U.S.S.R.** Mezhdunarodnaja Kniga, Moscow. G-200. — **YUGOSLAVIA.** Jugoslovenska Knjiga Terazije, 27, Belgrade; NAPRIJED, Trg. Republike 17, Zagreb.

Photo © Paul Almay, Paris

WORLD OF WANT
WORLD OF PLENTY

In vast areas of the globe millions go hungry while elsewhere countries have difficulty in finding outlets for their surplus food. To meet this paradoxical situation, the United Nations and the U.N. Food and Agriculture Organization five years ago set up a new form of international aid: the World Food Programme. Today the Programme helps to channel the food surpluses of 40 countries to relieve hunger and malnutrition in fifty others. (see page 30).